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LEVEL CHANGE SYSTEM FOR A FEDERALLY SUBSIDIZED VESSEL
PHASE II - DESIGN & INSTALLATION, PHASE III - EVALUATION

Prepared For:

TRANSPORTATION DEVELOPMENT CENTRE
POLICY AND COORD[illegible]ION GROUP
AND
MARINE POLICY & PROGRAMS TRANSPORT CANADA

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The contents of this report reflect the views of the authors and not necessarily the official view or opinions of the Transportation Development Centre of Transport Canada.

Un sommaire en français de ce rapport est inclus avant la table des matières.

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16. Abstract

This report documents the work performed under Phase II - Design and Installation, and Phase III - Evaluation of a TDC project for the Development of a Level Change System for a Federally Subsidized Vessel. A federally subsidized ferry service on Canada's East Coast was evaluated for accessibility to disabled and elderly persons during Phase I of this project. Concepts for a level change system were developed based on this assessment for boarding and between deck transfers of passengers with disabilities.

Based on this work, an on-board level change system was designed for installation on board the MV Prince Edward. The level change system design was submitted for approvals to the Canadian Coast Guard and Lloyd's Register of Shipping. After receiving approval, the system was manufactured, installed, tested and commissioned. Once the level change system was put into operation, an evaluation program was implemented to determine passenger and crew acceptance and to identify any safety concerns and improvement possibilities.

Both passengers and attendants provided positive feedback. The National Transportation Agency of Canada also evaluated the system, with favourable results, and recommended the outfitting of the MV Prince Nova, a sister ship. The system developed for the MV Prince Edward would be suitable for this installation.

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16. Résumé

Ce rapport décrit les travaux des phases II – Étude et Installation – et III – Évaluation – d'un projet lancé par le CDT concernant l'installation d'un système de transport vertical à bord d'un navire subventionné par le gouvernement fédéral. Au cours de la phase I du projet, les chercheurs avaient évalué, du point de vue de l'accessibilité aux personnes handicapées ou âgées, un service subventionné de traversier faisant la navette entre deux terminus sur la côte Est. Les concepts dégagés au cours de cette phase à l'égard d'un système d'embarquement et de transfert pour personnes à mobilité réduite ont été approfondis.

Un système de transport vertical embarqué destiné au N.M. Prince-Edward a été étudié et les plans soumis à la Garde côtière canadienne ainsi qu'à la Lloyd's Register of Shipping pour approbation. Une fois les plans approuvés, le contractant a fabriqué, installé, essayé et mis en service le système en question, qui a fait l'objet d'un programme d'évaluation visant à connaître la réaction des usagers et des préposés, et à cerner tous risques d'anomalies et possibilités d'amélioration.

La réaction tant des usagers que des préposés a été positive. De même, l'évaluation faite par l'Office national des transports du Canada ayant donné de très bons résultats, celui-ci a recommandé que le traversier N.M. Prince-Nova, jumeau du N.M. Prince-Edward, soit lui aussi équipé de cet élévateur pour la saison de navigation de 1992. Bien qu'étudié en fonction du Prince-Edward, ce système de transport vertical peut convenir aussi au Prince-Nova.

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SUMMARY

This project consisted of Phases II and III of a three-phased project for TDC, acting under a request from the Marine Policy and Programs division of Transport Canada. The purpose of the project was to define and evaluate the levels of accessibility of current level change systems, and to develop an appropriate system for disabled and elderly passengers on federally subsidized vessels that have no such equipment. The vessels evaluated were the MV Prince Edward and the MV Prince Nova which form part of a federally subsidized service operating between the Caribou Terminal in Nova Scotia and the Wood Island Terminal in Prince Edward Island. The first phase of the work consisted of problem definition, concept development and selection, and a plan for follow-on work. Phases II and III consisted of system and equipment design, development, manufacturing, installation and performance evaluation of the installed system on board the MV Prince Edward.

A detailed design for a level change system was undertaken, based on all applicable lift, elevator and Canadian Coast Guard standards and regulations that are presently in effect. Ergonomic considerations were included in the design of the system, specifically in areas of operation and appearance. The detailed interface and installation drawings produced were submitted to the Canadian Coast Guard and also Lloyd's Registry of Shipping, for approval. The system was approved by both the Canadian Coast Guard and by Lloyds.

One supplier was selected to provide a custom designed level change system for the MV Prince Edward based on past experience, ability to provide a system meeting all of the design criteria, and overall costs.

Once the design was approved, all of the components of the lift system, supporting hardware and materials were ordered.

All required vessel modifications, including the following, were detailed, contracted for, and implemented:

- preparation of steel trunk for the lift system,
- supply and preparation of electrical power supply,
- relocation of all piping, wiring, lighting, fire extinguishers, etc.,
- stringer bracket preparations,
- preparation of new hydraulic hose routing and protection.

A custom hydraulic level change lift system was manufactured to the developed specifications and assembled, installed and tested on board the MV Prince Edward. The installation timing was coordinated with the ship owners, Northumberland Ferries Ltd., Pictou Industries and Handicap Equipment Ltd., and the Canadian Coast Guard. The lift system was successfully installed and commissioned prior to the ship being put into service for the 1991 sailing season, which started in May and continued until December 1991. The functional testing and commissioning was designed to ensure that the complete system was safe, and that all design and applicable standards and regulation requirements were met.

An evaluation plan to monitor the level change system during the first year of operation was designed and implemented. The evaluation monitored the system's mechanical and human factors performance and considerations. A questionnaire for the passengers and a questionnaire for the attendants was developed to be used in the collection of the required data. All of the received questionnaires have been collected, summarized and analyzed. The results of the questionnaires are presented and

discussed in this report. In addition a "mystery rider" evaluation of the level change system was conducted using pre-instructed passengers.

The results of the evaluation have been very positive. Both the passengers and the attendants provided very positive feedback on the system. The National Transportation Agency of Canada has evaluated the system, also with very favourable results. A recommendation has been made by the National Transportation Agency of Canada to outfit the sister ship of the MV Prince Edward, the MV Prince Nova. The level change system developed for the MV Prince Edward could be installed on the MV Prince Nova.

SOMMAIRE

Ce rapport décrit les travaux des phases II et III du projet de recherche en trois phases lancé par le CDT à la demande de la Direction des politiques et des programmes maritimes de Transports Canada. Le but de la recherche était de définir et d'évaluer le degré d'accessibilité des systèmes de transport vertical sur le marché, et d'étudier un système de transport vertical des personnes âgées ou à mobilité réduite pour les navires recevant des subventions du gouvernement fédéral qui ne sont pas ainsi équipés. Les navires visés étaient les N.M. Prince-Edward et Prince-Nova, traversiers assurant un service subventionné de navette entre les terminus Caribou (Nouvelle-Écosse) et Wood Island (Île-du-Prince-Édouard). La phase I de la recherche a porté sur la définition des besoins et du concept approprié et sur l'élaboration du plan de recherches complémentaires. Les travaux des phases II et III ont porté successivement sur l'étude et la réalisation du concept retenu, suivies de l'installation et l'évaluation en service du système à bord du Prince-Edward.

Les ingénieurs ont commencé par l'étude détaillée du concept retenu, à la lumière des normes et des réglementations applicables, y compris celles de la Garde côtière canadienne. L'étude a également tenu compte des considérations ergonomiques, notamment pour ce qui est de l'exploitation et de l'esthétique. Les plans détaillés d'exécution et d'interfaçage réalisés ont été soumis à la Garde côtière canadienne et à la Lloyd's Register of Shipping, qui les ont dûment approuvés.

Un fournisseur a été sélectionné pour la fourniture d'un système de transport vertical conçu exprès pour le N.M. Prince-Edward, la sélection ayant été faite à la lumière des critères de l'expérience, de la conformité du concept aux exigences définies et du coût global.

Une fois le plan détaillé approuvé, tous les éléments nécessaires à son exécution ont été commandés.

Entre-temps, les modifications qu'il fallait apporter au navire visé ont pu être réalisées, à savoir :

- mise en place de la gaine pour la plate-forme élévatrice,
- fourniture et mise en place de l'installation électrique,
- déplacement des tuyaux, câbles d'alimentation et d'éclairage, extincteurs, etc.,
- mise en place des goussets de fixation des serres,
- préparatifs pour l'installation de la canalisation hydraulique et sa protection.

Un système de transport vertical à commande hydraulique a été fabriqué conformément aux spécifications, assemblé, installé et éprouvé à bord du N.M. Prince-Edward. Le calendrier des travaux de mise en place a été convenu entre l'armateur, Northumberland Ferries Ltd., Pictou Industries and Handicap Equipment Ltd. et la Garde côtière canadienne. La plate-forme élévatrice a été installée et mise en service avec succès avant le début de la saison de navigation de 1991 qui va de mai à décembre. Les épreuves de réception et de mise en service ont permis de s'assurer que la plate-forme élévatrice installée est sûre et qu'elle satisfait à toutes les normes et réglementations applicables en vigueur.

Au cours de la première année de service, un plan d'évaluation des performances de la plate-forme élévatrice a été élaboré et mis en oeuvre; cette évaluation a porté sur le fonctionnement mécanique, l'adéquation ergonomique et d'autres facteurs. Un questionnaire destiné aux usagers et un autre aux préposés ont permis de recueillir l'appréciation des uns et des autres sur cette plate-forme élévatrice. Tous les questionnaires retournés ont été dépouillés et analysés; les résultats sont présentés et commentés dans le rapport. En outre, l'appréciation d'un «usager mystère» a été obtenue, celui-ci ayant été sélectionné parmi un certain nombre de passagers qui avaient été instruits au préalable du fonctionnement du système.

La réaction tant des usagers que des préposés a été positive. De même, l'évaluation faite par l'Office national des transports du Canada ayant donné de très bons résultats, celui-ci a recommandé que le traversier N.M Prince-Nova, jumeau du N.M. Prince-Edward, soit lui aussi équipé de cette plate-forme élévatrice pour la saison de navigation de 1992. Bien qu'étudié pour la saison de navigation de 1992. Bien qu'étudié en fonction du Prince-Edward, ce système de transport vertical peut convenir aussi au Prince-Nova.

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1.0 INTRODUCTION

1.1 BACKGROUND

This project was conducted by W.R. Davis Engineering Limited (DAVIS) in conjunction with German & Milne Inc. and Behavioral Team, A Corporation under a contract with the Transportation Development Centre (TDC) in response to the needs of the Marine Policy and Programs Group of Transport Canada. The project investigated accessibility problems and proposed and implemented solutions to provide barrier-free accessibility to elderly and disabled passengers on federally subsidized ferry services.

The Marine Atlantic Advisory Task Force, established in 1980, made a number of recommendations to ensure disabled passengers access to federally subsidized ferry service equal to that afforded other Canadians. As a result, all Marine Atlantic terminals are wheelchair accessible, and are equipped with communications systems. Recommendations regarding the accessibility of vessels included the provision of lifts and elevators for transferring physically disabled passengers between decks. New vessels have been built according to barrier-free standards and some vessels have been retrofitted. However, a problem exists in two older, federally subsidized vessels - the MV Prince Nova and MV Prince Edward - and it is conservatively estimated that these will be in service for the next 10 to 14 years.

A major accessibility barrier existed on these two vessels. Physically disabled passengers - especially wheelchair users who drive on board in their vehicles, cannot transfer from the vehicle deck to the passenger deck. Strictly speaking, regulations do not allow passengers to remain in their vehicles during the voyage, although this is tolerated on open-deck vessels.

Marine Policy and Programs requested TDC to undertake a 3-phased project to define and correct the level change problems that exist in federally subsidized vessels which are not equipped with level change systems. Existing level change technology was reviewed for possible adaptation, and concepts were developed. The most promising was selected for prototype development, subsequent installation, field trials and evaluation. Under this contract, only the MV Prince Edward was modified and equipped with a level change system for disabled persons.

The first phase of the work included problem definition, concept development and selection, and a plan for follow-on work. The system concept selected from Phase I was an on-board wheelchair lift and elevator system. The on-board wheelchair lift and elevator system met all the requirements for between deck transfers for wheelchair and other physically disabled passengers, and satisfied the federal government's mandate to provide accessible transportation services to disabled passengers. Phase II of the project involved the design and installation of a level change system for between deck transfers of disabled passengers. In addition an in-service evaluation, Phase III, was designed and conducted to assess passenger and operator acceptance of the system. The wheelchair lift and elevator system was designed and submitted for approval to the Canadian Coast Guard and Lloyds. The system as submitted was approved by the Canadian Coast Guard and Lloyds. Upon further review of the proposed system by Transport Canada Marine Policy and Programs a request to design and supply a single lift system was made to DAVIS. As a result, a single level change system was designed and approved by the Canadian Coast Guard and Lloyds Register of Shipping. Authorization was received from Marine Policy and Programs and TDC to proceed with equipment development, installation, and performance evaluation of the single level change system on board the MV Prince Edward.

1.2 OBJECTIVES

The objectives of Phase 2 and 3 of the project were as follows:

- Design, manufacture and install a level change system for persons with disabilities on the federally subsidized vessel, the MV Prince Edward;
- Perform functional testing/commissioning of the installed lift system;
- Perform an in-service evaluation of the system.

2.0 DETAILED DESIGN

Detailed design activities under Phase II were conducted for the on-board wheelchair lift and elevator system, and for the single lift level change system. The single lift level change system was the system that was taken to final detailed design, construction and installation phases. The initial detailed design activities consisted of identifying general considerations to be met, and development of an engineering methodology to aid in the various design phases of the level change system. Based on the general considerations and on the design methodology developed, manufacturing and interface drawings were produced. Technical and installation specifications were also developed during the detailed design activities, and during the development of the manufacturing and interface drawing. All applicable safety standards and regulations were reviewed and applied as required during the detailed design activities. As noted before, the wheelchair lift and elevator system was replaced with a single lift level change system, under the request of Marine Policy and Programs. The following describes the major activities that were performed under the detailed design tasks.

2.1 GENERAL CONSIDERATIONS

The general considerations that were used in the design of the two different level change systems were as follows:

- all relevant safety standards, elevator/lift standards and marine vessel construction and electrical standards were applied in the final detailed design of the lift system;
- the lift system should provide service for one wheelchair passenger, or one physically disabled passenger and one attendant, between the vehicle deck and the passenger deck. The lounge, observation area, cafeteria and washroom facilities are on the passenger deck. The lift system should be as small as possible while providing the above accommodation in order to minimize lost deck space;
- the lift system should be as maintenance free and reliable as possible, and be able to operate at sea;
- the installation of the lift system should require minimal mechanical, structural and electrical modifications to the ship;
- the system total costs should be as low as possible, while providing high levels of safety and comfort, as well as good appearance and low operating and maintenance costs;
- the lift system should be ergonomically suitable to the passengers and attendants;
- the lift system shall provide the utmost in safety and reliability during emergency operations;
- the system should be as aesthetically pleasing as possible.

2.2 ENGINEERING DESIGN METHODOLOGY

The following outlines the major considerations and steps that were taken in the detailed design of the two different level change systems for disabled passengers, for installation on the MV Prince Edward:

- Based on the Phase 1 problem definition and technical specifications developed, a two component system consisting of a wheelchair lift and elevator system was selected, the concept designed, and the performance requirements defined;
- The production drawings for the MV Prince Edward were inspected and analyzed;
- The ship was inspected to determine optimum location of wheelchair lift and elevator system;
- Updated information was gathered on the different types of wheelchair lift and elevator systems available;
- Technical specifications and requirements for the wheelchair and elevator system were further developed, as based on the Phase I results, and presented to manufacturers to find out which manufacturers could accommodate the project requirements;
- Ship interface drawings were produced for the wheelchair lift and elevator system, which included all structural changes and additions. These drawings were submitted for approvals by the Canadian Coast Guard Ship Safety Branch and Lloyd's Register of Shipping;
- Upon further consideration, TC Marine Policy and Programs requested that a single lift system be designed following further technical specification review, analysis and development. The single lift system to be designed would have to be approved by the Canadian Coast Guard before construction and installation could commence;
- A vessel inspection for optimum location for the single lift level change system was conducted;
- An ergonomic evaluation of the proposed system and the technical specifications was performed, and the design of the system and the technical specifications adjusted as required to ergonomically optimize the system;
- Technical specifications for the level change systems were finalized;
- The most technically feasible and cost effective lift system was selected and a detailed design completed. All safety standards and regulations were reviewed and utilized in the design of the level change system. Ergonomic considerations were incorporated in the detailed design;
- Detailed design of ship interfacing to the lift system was performed, which included areas such [illegible] signage, lift operation, ramps, entrance/exit dimensions etc;
- Ship interface drawings were produced for the single lift system and submitted for approvals by the Canadian Coast Guard Ship Safety Branch and Lloyd's Register of Shipping;

- Installation specifications were developed, to aid in the installation of the level change system and to ensure that all installation requirements were met;

- Detailed manufacturing drawings for the lift system were produced.

2.3 MANUFACTURING DRAWINGS AND INTERFACE DRAWINGS

2.3.1 Combination Lift and Elevator System

Four (4) locations for this system were proposed at the Preliminary Design Phase. These locations were at the forward or aft end of the machinery casing(s) on either port or starboard side.

The chosen location was at the forward end of the port casing.

Since the casing itself was not wide enough to accommodate an elevator shaft it was decided to use a wheelchair lift to raise the passenger to the Mezzanine Deck level, then transfer through the arthwartship end bulkhead on the Mezzanine Deck to an elevator contained in a shaft upwards to the Passenger Deck, and hence to the Bridge Deck which is the lifeboat embarkation level.

Except for the addition of a flat at the Mezzanine deck and construction of the elevator shaft casing, very little other structure would be disturbed. Some rerouting of minor electric cables and piping would be necessary together with relocation of a small number of outfit items.

The wheelchair lift would be stowed at the Mezzanine level and thus would not impede the vehicular traffic below, when not in service.

This system was drawn out in detail to suit the configuration of the MV Prince Edward and to satisfy all of the Canadian Coast Guard ship, elevator and lift regulations and requirements.

2.3.2 Single Lift System

2.3.2.1 General

After much thought and discussion by and with TC Marine Policy and Programs personnel on the completed detailed design of the wheelchair lift/elevator system, it was decided to pursue a single lift design. During this investigation it was determined that a satisfactory single lift system had been previously fitted on another vessel, the M.V. Northern Princess, which had similar accessibility problems and characteristics. It was also determined that the system as installed had been approved by the Canadian Coast Guard and Lloyd's Register of Shipping.

As a result, a single lift system was then designed and drawn out in detail, to suit the configuration of the MV Prince Edward. The detailed drawings were submitted for approval and after acceptance by Ship Safety, Lloyds and the Owner, implementation was initiated on the vessel.

The selected location was in the same general area as for the initial system i.e. forward on the port side. The actual location is forward of the athwartship end bulkhead of the Mezzanine Deck. The exact location, between frames 90 and 93, was selected to keep the installation clear of the shipside web at frame 94 and the stringer end bracket at the Mezzanine Deck level between frames 89 and 90.

The lift was designed to operate from the Vehicle Deck at the bottom, to the Passenger Deck at the top.

The lift cab is stowed, when not in use, at the Passenger Deck level and control is from a Control Station at the Vehicle Deck, and from inside the lift.

2.3.2.2 Structural Additions and Modifications

Structural additions and modifications, as designed, were of a minor nature for the installation procedure of the lift. This would ensure minimum problems during approval by the Canadian Coast Guard and Lloyd's Register of Shipping.

A steel trunk was designed on the Passenger Deck with openings cut for doors to give access to the lift.

In designing the trunk, an area of sidescreen was designated to be plated in. Thickness of plating and stiffener size was selected to match the existing sidescreen. Since no forces from the lift were acting on the remaining bulkheads of the trunk the scantlings of these were as for minor superstructure bulkheads.

An opening in the Passenger Deck was designed of sufficient dimensions to accommodate the lift cab, its supporting rails and associated mechanical equipment. Compensation stiffening was added to the outboard sides of the opening.

Brackets were added to the ship's side to accept the elevator manufacturer's support rail brackets.

At the Vehicle Deck, steel pipe protection posts were designed to prevent vehicle damage to the elevator support rails, mechanical equipment and control station.

Minor modifications were also planned to the ships steering controls trunk under the Bridge Deck, to accommodate the elevator ancillaries.

2.3.2.3 Outfit Additions and Modifications

Various outfit items were designed or designated to be removed and refitted at either the same or another location.

These items included:

- Deck seats;
- Lighting and associated cabling;
- Scupper and drain piping;
- Fire hose connection and piping.

Since the elevator's lower position was not flush with the Vehicle Deck a portable aluminum ramp was designed and storage provided on the ship's side.

2.3.2.4 Drawings for the Single Lift System

Based on the detailed design activities, and the technical and installation specifications, the interface drawings were produced for the single lift system. These drawings were submitted for approval by the Canadian Coast Guard Ship Safety Branch and Lloyd's Register of Shipping.

Based on these interface drawings the final layout and design of the lift system was completed. The detailed manufacturing drawings were finalized and produced.

Appendix A contains a copy of the lift system manufacturing drawings and Appendix B contains a copy of the lift system interface drawings.

2.4 DEVELOPMENT OF TECHNICAL SPECIFICATION FOR THE LEVEL CHANGE SYSTEM

Based on the work performed during Phase 1, along with the vessel inspection, detailed design activities, discussion with German and Milne, Behavioral Team, TDC, Northumberland Ferries, Marine Policy Group and Elevator Manufacturers technical specifications were developed for the lift system to be designed, manufactured, supplied and installed on board the MV Prince Edward.

The following summarizes the major items in the developed technical specifications:

- The lift system should be suitable for a wheelchair occupant and operator, and provide service between the passenger deck and the vehicle deck. Basic lift dimensions to be 1.40 m x 0.15 m (4.59 ft. x 2.46 ft.).

- The lift system shall meet all applicable regulations including:

  - CAN/CSA-B355-M86;
  - CAN-3-B44-M85 and LAN-3-B44SI-87 Regulations, Section 38 CSA C22.1 1990;

  as well as the Draft Barrier Free Design Standards for Ferry Services by Marine Policies and Programs, November 18, 1986.

- Signs and controls in accordance with the International Symbols of Accessibility and all applicable lift and elevator regulations and standards should be provided.

- A "dead-man" control system is to be provided, which requires the operation of the system by two attendants, one in the cab and one on the car deck to ensure a clear descent path.
- All required safety systems such as interlocking doors, emergency stop buttons, keyed on-off switch, emergency lighting and audio systems should be provided.
- Back-up power for emergency lowering of the cab should be provided.
- Manual means to lower the cab should be provided.
- Proper operation of the lift under marine type environments, and in temperatures ranging from -40°C to ±40°C should be ensured.

Appendix C contains the detailed technical specifications.

2.5 DEVELOPMENT OF THE INSTALLATION SPECIFICATIONS FOR THE LIFT SYSTEM

The installation specification developed describes the work required to prepare the vessel for installation of the level change system on the M.V. Prince Edward. This specification was developed utilizing the work performed under Phase I, and as per all applicable marine design and construction practices.

The intention of the installation specification was to provide sufficient information and guidance to permit the vessel modifications to be performed, complete in all respects and conforming to the requirements of the Regulatory Bodies. Appendix D contains the detailed Installation Specifications. The following summarizes the major points in the Installation Specifications:

- Modifications to the ship's structure and outfit, and the fabrication and installation of a new lift trunk extending from the Passenger Deck to the underside of the Bridge Deck, including removal and restoration, which are required to accommodate a new lift.
- The supply and installation of three steel posts to protect the lift rails and hydraulic cylinder.
- The fabrication, supply and installation of a lockable machine enclosure and support for the lift motor, pump and controller.
- The preparation and supply of the required electrical power supply.
- The electrical installation necessary for the support for operation, lighting and signalling of the lift.
- All painting of new and disturbed work, and sign placement.
- The necessary access for maintenance of the lift and its equipment.
- Adaption of deck at the passenger level to eliminate the camber and the elevation difference at the outside of the trunk and door frame.

- Fabrication and supply of a portable ramp and storage brackets.

- Functional testing and commissioning of the system.

2.6 ERGONOMIC REVIEW OF DETAILED DESIGN

The steps in this task included the following:

- identify and review sources of ergonomic documentation;
- review design issues related to operational aspects of the system;
- develop recommendations.

2.6.1 Summary

During the ergonomic review activities the detailed design and operation of the level change system was evaluated for ergonomic compatibility. The following areas were evaluated:

- annotated photographs of the intended retrofit
- features of the lift cab
- the draft specification for the installation of the level change system on board the MV Prince Edward
- signage needs

Recommendations covered several topics including:

- features of accessible ramps, passages, and cab hardware
- selection, wording, and placement of signage
- considerations related to the crew/elevator operation
- safety considerations for lift operation

2.6.2 Scope and Activities

The scope of this task consisted of the analysis of ergonomic considerations related to the detailed design.

Overall ergonomic recommendations were based on:

- barrier free design documents such as:
    - Barrier Free Design Standards for Ferry Services - Draft, 1986
    - CSA-B44-M90 Appendix E - Elevator Requirements for the Handicapped
    - CSA-B651-M90 Barrier Free Design

- general ergonomic sources such as:
    - Human Factors Engineering Guide for Evaluation
    - Wayfinding in Public Buildings
    - Elevator Use for Egress: The Human Factors Problem and Prospects
- contacts with experts from organizations such as:
    - CNIB
    - Barrier Free Design Centre
    - Hugh MacMillan Rehabilitation Centre

2.6.3 Ergonomic Design Recommendations

2.6.3.1 Design Issues for the Level Change System

The following recommendations were presented.

Cab Illumination - Standards require illumination levels of at least 100 lux. Some issues to consider are:

a) people whose eyes have cloudy lenses, due to age for example, require up to 3 times more light than do people with clear vision;

b) the elevator interior should be neither excessively dim nor bright relative to its surroundings. People going from the bright outdoors would require higher lighting levels than those adapted to night time lighting levels. For this reason, consideration should be given to providing variable lighting levels in the cab.

Handrails - There are fairly specific requirements for handrail placement, size, shape, and strength in the standards. As well, the Marine Policy and Programs draft standard calls for at least 2 handrails. If the cab is subject to cold temperatures, a material with low heat conductivity is preferable. Metal handrails can be covered with plastic or the optional oak handrails can be used. As well, handrails should be made highly visible through the use of colour contrasting finish. The oak handrails are also favoured from an aesthetic point of view.

Door knob - Door knobs are not considered barrier free door hardware. The doorknob on the elevator door does not "provide for an adequate grip" (CSA-B651-M90). Consider using alternative door hardware recommended in CSA-B651-M90 (e.g. lever handles).

Mirror - A mirror on the back wall of the elevator cab wou. allow a wheelchair user an adequate view of the landing when backing out of the elevator.

Jump Seat - If feasible, a jump seat should be incorporated into the cab. Although not a requirement in the standards, this feature would be very useful for ambulatory people with limitations of stamina or leg strength, for example.

2.6.3.2 Review of the Specification for the Installation of a Level Change System

The following points *in italics indicate the recommended changes, as developed during the ergonomic evaluation to the specification text; plain text indicates the original text.* The specification text is provided in Appendix C.

- *specify additional types of users* - text: The installation of a wheelchair lift and elevator suitable for use by a wheelchair occupant *or other person with limited mobility (e.g. cane user)* and attendant operator.

- define what is meant by "smooth operation" - text: Test 1: The elevator shall be called to and from each landing to demonstrate smooth operation, *that is operation that wheelchair users find acceptably smooth when compared to other elevators with which they are familiar.*

- if the ramp is portable, specify a design that will not put the person carrying the ramp at undue risk - *The portable ramp shall be designed using sound principles of manual materials handling with particular regard to minimizing any risk of injury for the person carrying the lift. Particular attention shall be given to:*

  - *keeping the total weight to a minimum which is approximately the action limit (i.e. the weight above which the risk of injury increases above nominal levels)*

  - *design and use of manual handling aids such as handles and wheels*

In making this recommendation, it is recognized that ramp size involves trade-off between minimizing the weight of the ramp for the crew member and providing gentle slope for the wheelchair user.

- Address clearance needed for wheelchair access - text: *A clear passage to the elevator shall be provided using at least the minimum dimensions in CAN/CSA-B651-M90. These are:*

- *straight passage:*	*920 mm*
- *doors and other short indentations:*	*810 mm*
- *route requiring a U turn over less than 1200 mm*	*1100 mm*
- *route requiring 2-way wheelchair traffic*	*1500 mm*

- Emphasize the use of sound principles in signage development - text: *Any sign shall be designed in accordance with sound principles for:*

  - *signage placement*
  - *letter font legibility*
  - *content clarity*
  - *illumination (if required)*

- Emphasize the use of sound principles in signage development - text: *Signs shall address special considerations related to disability including:*
    - *larger letter sizes to compensate for reduced acuity*
    - *use of tactile signage where appropriate*
    - *appropriate use of the international sign for accessibility*
    - *suitable viewing angles for wheelchair users*

- Emphasize the importance of empirical testing on signage - text: *Users should be canvassed to identify any sources of confusion.*

2.6.3.3 Signage Recommendations

The following recommendations were presented with respect to signage requirements.

Signs Required

The four types of signs are listed below to assist with the task of identifying the required signage:

- orientation signage: allows users to determine where they are in relation to where they want to go (e.g. floor plans)

- directional signage: points towards a selected destination (e.g. any sign with an arrow)

- identification signage: information that identifies a destination (e.g. handi-elevator identification)

- general information signage: any other information (e.g. instructions to ring for service)

Sign Placement

- Signs should stand out from their surroundings; one or more of the following design strategies could be used: sign location, sign design (e.g. size), removing clutter from around the sign.

- Signs placed perpendicular to the path of travel are more conspicuous for people with limited peripheral vision or restricted head movement.

- Similar types of signs should be placed in consistent locations.

- Where possible, signs should be at eye height for a standing person, to allow them to get as close as desired to read them.

- Sign placement should be based on:
  - where the user will need the information;
  - where the user is likely to look for the information.
- For wheelchair users, special consideration should be given to any orientation or general information signs used. Either the location or letter size should be adjusted so as to be readable from a seated height.

Legibility

- There is little difference among common signage fonts in terms of legibility.
- To be safe, any unusual fonts should be avoided (e.g. fancy fonts or fonts with unusual width/height ratios or stroke widths).
- Lower case is most readable. Mixed Case Is Somewhat Less Readable. UPPER CASE IS THE LEAST LEGIBLE OF ALL.
- The actual size of the letters depends on the intended viewing distance. Take advantage of opportunities to make letters bigger; even among the general population, viewers rarely have 20/20 vision.
- Contrast print materials or coatings on sign should be avoided.
- The easiest way to ensure adequate letter/background illuminance contrast is to use black on white or vice versa.
- The advisability of using colour depends on the colours used. Bright colours on black are preferred; dark coloured letters on light coloured backgrounds are usually not advisable.

Illumination

- Avoid sign/lighting combinations that create glare.
- CSA-B651-M90 recommends 200 lux minimum illumination on signs.
- Consider the light adaptation level of the intended viewers. If they are coming from a bright area, they may require more illumination to see properly.
- Eye lens lose their transparency with age so older people and others with certain vision disorders require more light than the average person does.

Tactile Signage

- Options include raised letters, braille, and tactile strips.
- Raised letters should be designed as follows (from CSA - B651-M90)

  - raised at least .8 mm
  - size: between 16 and 50 mm high
  - font: sans serif
  - centerline: if wall mounted, 1500 ±25 mm

- Tactile signage should be placed consistently, this is particularly critical for signage with tactile elements.

- If braille and raised letters are used together, place braille to left of raised letters.

- Not all blind people read braille.

2.6.3.4 Review of Northern Princess Photographs for Ergonomic Design Recommendations

The following was recommended based on a review of photographs of the level change system on board the Northern Princess Ferry.

- There should be an auditory warning on main deck when the elevator is in motion.

- The outside of the cab should include some reflective or yellow tape.

- The operator controls should be located facing the door side of the cab.

- The activation of cab controls should be only possible by trained members of the crew. This could be accomplished by installing a key-and-lock set-up and providing keys to the trained personnel.

- A method should be provided so that a person wanting to use the elevator can summon an elevator operator. An "ask for assistance" sign is not very satisfactory. Better would be a more specific instruction; best would be a button that summons the elevator operator. Also, it should be perfectly clear that an operator is required to use the elevator.

- The first signage requirement to be provided for is identifying the location where to park to use the elevator. This need not be a sign, any landmark will do. However, this identifier needs to be visible from the place the driver is directed to park.

- The fact that the elevator will not be visible when not in use has some signing implications:

  - Avoid arrows that point to the elevator on the main deck. When the elevator is not there, it will not be clear what the sign is pointing to.

  - Place a handi-elevator pictogram on the ship wall to identify the location of the elevator. A sign with supporting information such as "summon elevator operator here" might be considered.

- Consider a sign that indicates to the wheelchair user what side the elevator door will face so they can orient themselves while the elevator is descending. This could be painted on the floor along with the elevator footprint.

The above ergonomic recommendations have been incorporated into the detailed design of the level change system. Section 7.0 discusses in more detail the recommendations and solutions selected.

2.7 APPROVAL

The ship modification and installation drawings developed and produced during the detailed design activities for the single lift system were submitted for approval to both the Canadian Coast Guard Ship Safety Branch and Lloyd's Register of Shipping.

The drawings submitted were as follows:

Drawing No.: 7349B-401-02 "General Arrangement"
Drawing No.: 7349B-219-02 "Structural Modifications"
Drawing No.: 7349B-600-01 "Single Line Diagram"

The above drawings have been approved by the above noted regulatory bodies. Copies of the drawings and their respective approval letters are included in Appendix B.

3.0 IMPLEMENTATION

3.1 SHIPYARD SCHEDULE

The MV Prince Edward was in dry dock at Pictou Industries Ltd. during the time the ship modifications and lift system installations were planned.

Based on the initial detailed design, the specifications for the preparation of the vessel and for the installation of the wheelchair lift and elevator system on board the MV Prince Edward, a schedule for the ship modifications and wheelchair lift and elevator system installation was developed by DAVIS, Handicap Equipment Ltd., Northumberland Ferries and Pictou Industries.

Since an alternative design was requested by TC Marine, after the first design was completed and submitted for approval, and since the approval procedure for the second detailed design of the single lift system was very lengthy, the initial planned schedule was delayed considerably. The vessel preparations such as main electrical power supply hook up, structural modifications, bulkhead welding and lift bracket installations were started in March 1991. The actual lift system components however, did not arrive until April 23, 1991. As a result the time to install, test and commission the lift system before May 1, 1991, the planned date for the MV Prince Edward to be in operation, was very tight.

Even with the very tight time constraints the lift system was successfully installed, tested and commissioned prior to the ship going into service.

3.2 PROCUREMENT OF MAJOR COMPONENTS

All major system components were detailed in the technical specification for the lift system. Several supplier quotes were evaluated for technical compliance, cost effectiveness and past lift system design, manufacturing and installation expertise. Handicap Equipment Ltd. was selected as the most cost efficient and technically compliant supplier of the required lift system.

Approved procedures were followed in the procurement of the selected lift system. A detailed technical specification and a detailed statement of work was developed and used as a basis for a purchase/installation contract between DAVIS and Handicap Equipment. The complete lift system was certified by Concord Elevator to meet CAN/CSA-B355-M86 Safety Standard.

Pictou Industries performed the ship structural modifications and trunk construction. All raw materials were supplied by Pictou Industries. The raw materials used were as per Canadian Coast Guard Ship Safety and Lloyd's Register of Shipping requirements and quality standards.

3.3 FABRICATION AND INSTALLATION

The lift system was custom manufactured for the MV Prince Edward installation as per the detailed specifications that were developed for this project.

A newly designed 1:2 cable hydraulic system was used for this lift to provide motive power. All relevant safety standards, elevator/lift standards and marine vessel mechanical, hydraulic and electrical requirements were considered in the fabrication and installation of this lift system.

Various fabrication methods were implemented to ensure satisfactory performance under sea operation. All steel components were primed and painted with "Rust-O-Leum" paint. The hydraulic cylinder was fully chromed and galvanized aircraft cable was used to minimize corrosion. All electrical wiring and connectors were weather-proofed. The pump was specifically designed and built for sea duty, with splash baffles and raised breather/access inlets to minimize or eliminate leaking due to heavy seas environment.

The complete lift system, as described in Appendix A of this report, was assembled and tested at the factory before shipment for the on-site installation.

As with any prototype system installation, some minor problems were encountered during the installation. Most of these were minor clearance and dimensional interference type problems along with time and installation sequence problems. All of the above were successfully resolved during the installation.

Some of the modifications that were performed during the installation are as follows:

- The sprinkler system was relocated.
- An aluminum ramp and storage bracket were custom manufactured.
- A lockable, water proof plywood enclosure for the hydraulic and electronic controller unit was custom manufactured.
- Three steel protection posts were custom installed to protect the lift rails and hydraulic cylinder.
- The lift system power panel was hooked up to the ship's essential power supply grid.
- The passenger deck was adapted to eliminate the camber and elevation difference between the trunk doorway and the deck.
- Additional lighting was installed in the lift trunk.

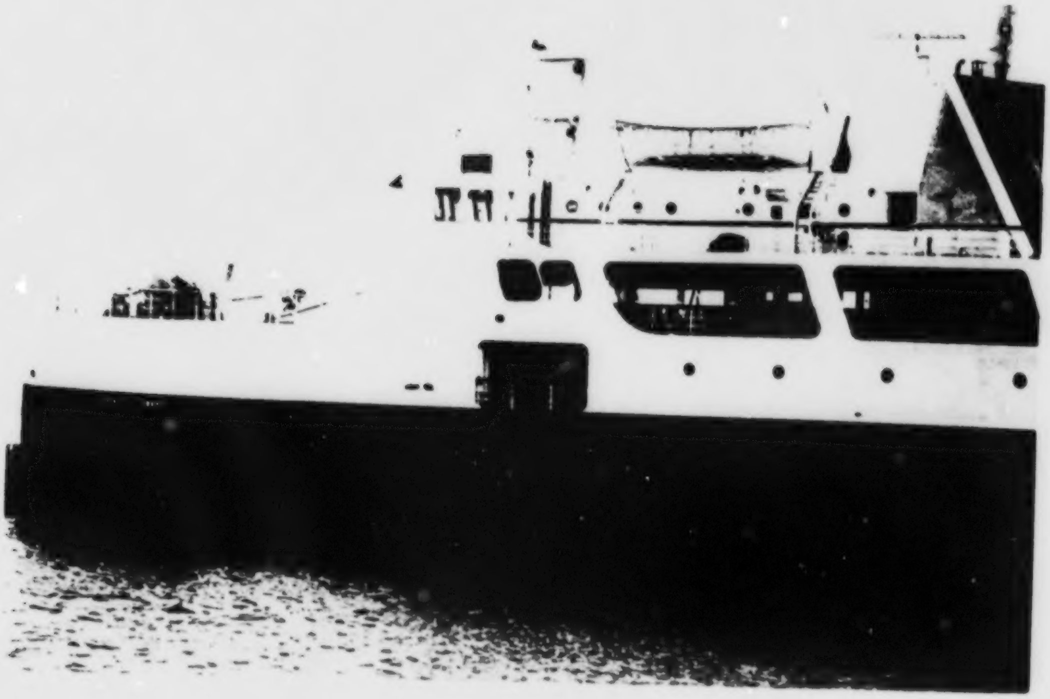
In addition, both Lloyd's Register of Shipping and the Canadian Coast Guard Ship Safety Branch inspected the ship modifications and lift installation on a continuing basis.

Photographs #1 and #2 contain views of the ship, the trunk, and the sidescreen plating.

Photographs #3 and #4 contain views of the level change system installation, including lift rails, pump/motor and controller.

Photograph #5 shows a view of the installed lift rails and the hydraulic cylinder with the two-to-one steel cable system.

Photograph #6 shows the finished trunk and the level change system exterior door, on the passenger deck.

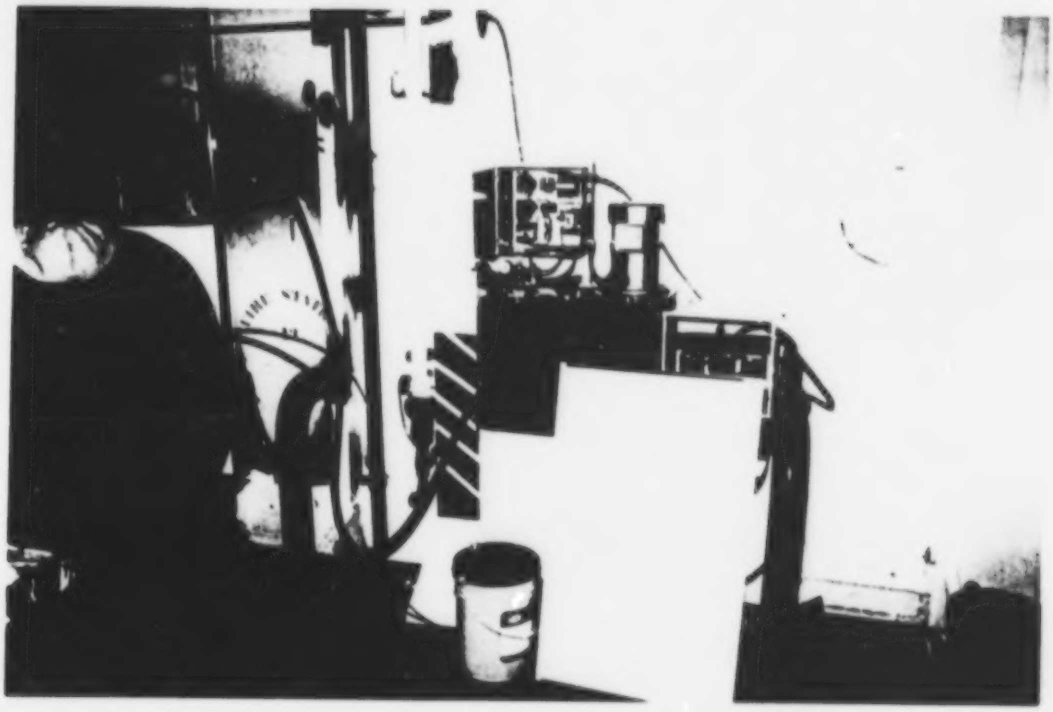


PHOTOGRAPH 1: VIEW OF THE MV PRINCE EDWARD AND THE SIDESCREEN PLATING ADDED FOR THE NEW TRUNK FOR THE LEVEL CHANGE SYSTEM

PHOTOGRAPH 2: VIEW OF THE TRUNK FOR THE LEVEL CHANGE SYSTEM ON THE PASSENGER DECK

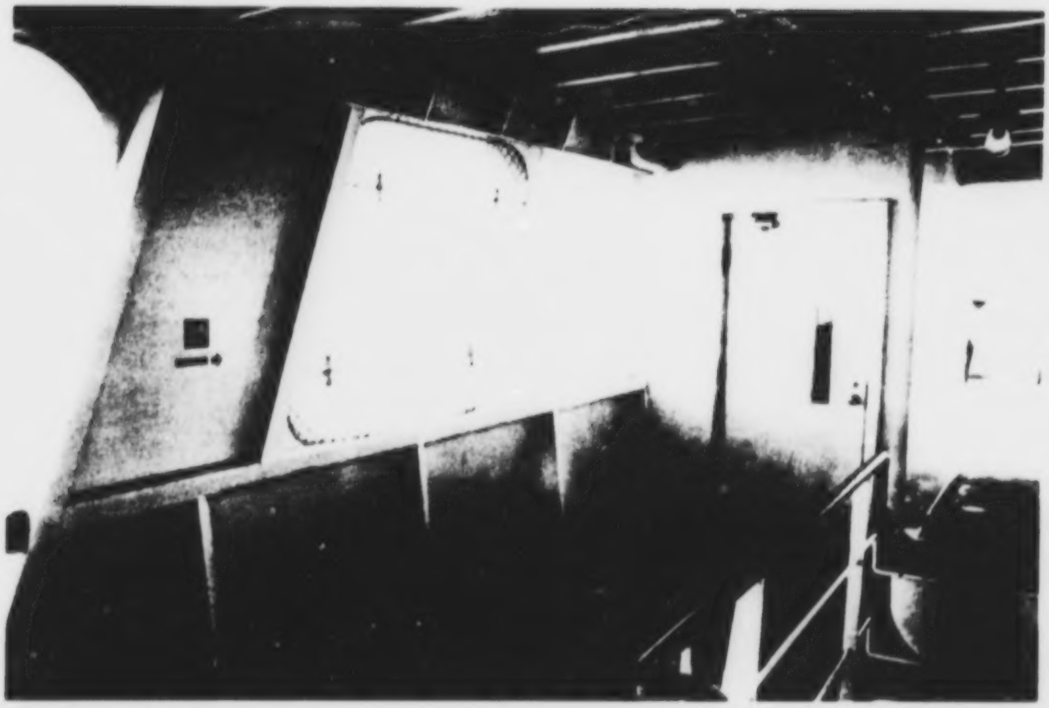
NO SMOKING OR
NAKED LIGHTS
ON THIS DECK
OFF NO 331725
REG TONS 926.69
DE FUMER

PHOTOGRAPH 3: VIEW OF THE LEVEL CHANGE SYSTEM DURING INSTALLATION



PHOTOGRAPH 4: VIEW OF THE LEVEL CHANGE SYSTEM PUMP/MOTOR, CONTROLLER DURING INSTALLATION

PHOTOGRAPH 5: VIEW OF THE LEVEL CHANGE SYSTEM RAILS AND TRUNK INTERIOR



PHOTOGRAPH 6: VIEW OF THE LEVEL CHANGE SYSTEM EXTERIOR DOOR AND PASSENGER DECK TRUNK

Photographs #7 and #8 shows details of the level change system interior and the keyed control panel.

Photographs # 9 to #10 contain views of the lift as installed and the general location of the following:

- sprinkler system,
- aluminum ramp storage position and location,
- lift signage for disabled users,
- warning and operations signs,
- "Dead-Man" controls,
- lockable plywood enclosure for the hydraulic and electric controller unit,
- steel protection posts for the lift rails and hydraulic cylinder.

Photographs #11 and #12 show the level change system during operation. The portable ramp is shown being positioned to allow entry into and exit into from the level change system by a disabled passenger on the car deck. Also shown is the level change system during a descent and the location of parked vehicles.

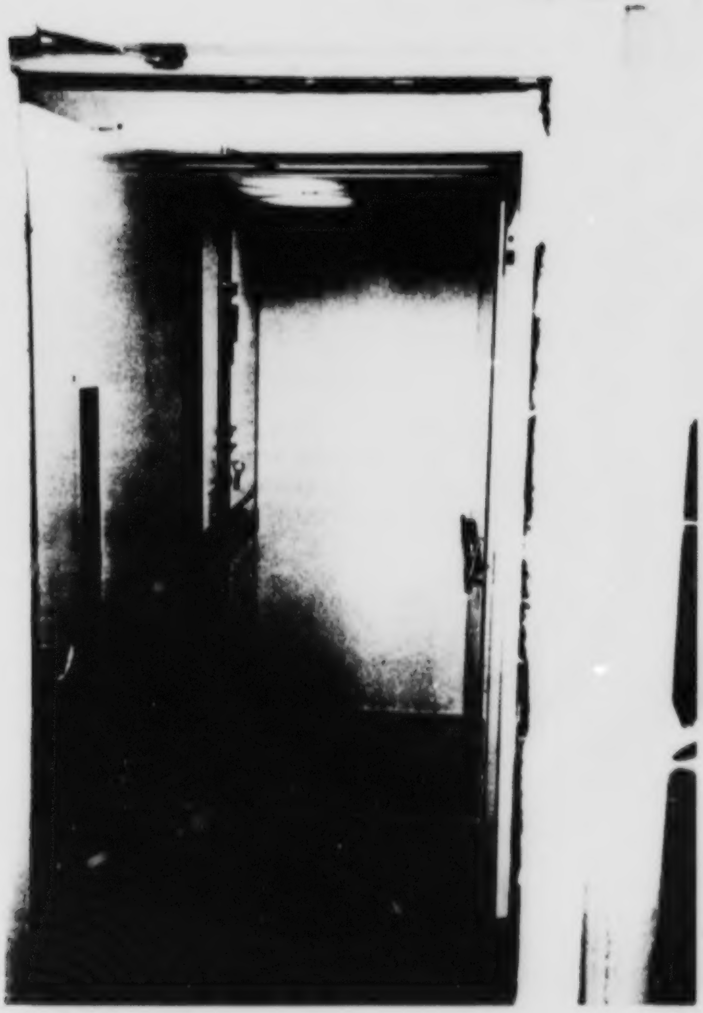
3.4 FINISHING AND SIGNAGE

All steel construction and alterations were ground smooth as and where required and then primed and painted. Weatherstripping was installed on the trunk exterior door to minimize water ingress into the lift trunk area. Special non-skid material (6" wide strips) was installed at the passenger deck, just in front of the exterior trunk doorway. This same non-skid material was installed on the custom-made aluminum ramp to increase levels of traction and minimize the possibility of slippage by a wheelchair or while walking up or down the ramp.

The plywood pump/motor controller lockable enclosure was silicone sealed and weather stripping installed around the access door. The plywood was primed and painted.

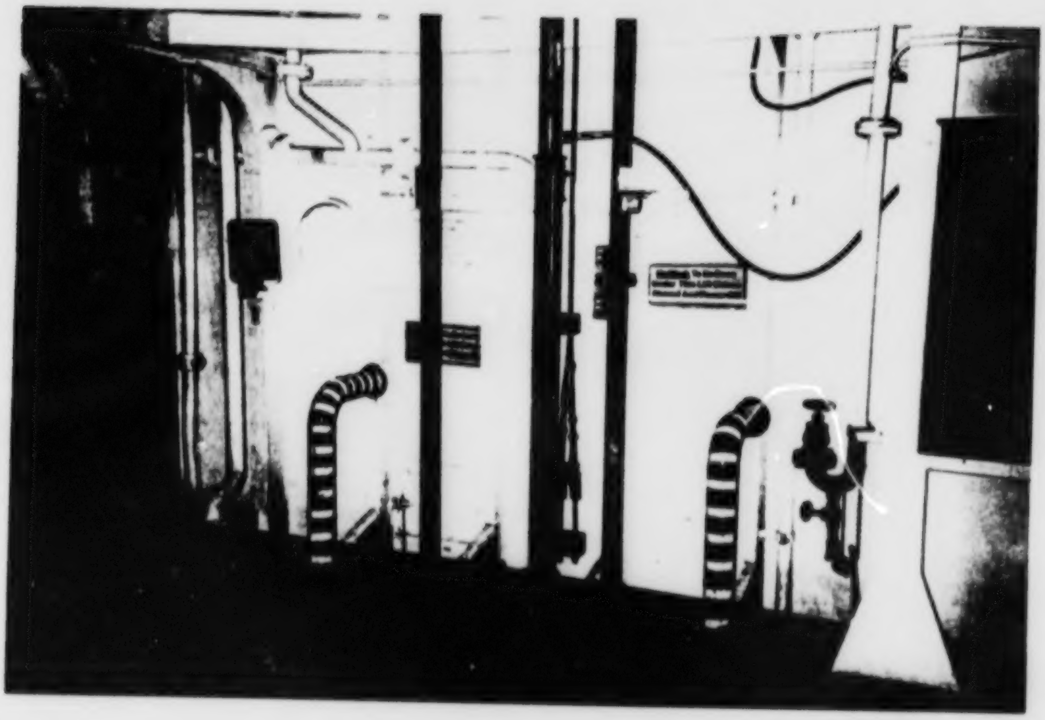
The following signs were installed inside and outside the lift system:

- an elevator for disabled persons graphic symbol sign, white on blue 30.5 m x 30.5 m (12" x 12") installed at the vehicle deck on the pump/motor controller plywood enclosure.
- an elevator for disabled persons graphic symbol sign by the "Dead Man" controls 30.6 m x 30.5 m (12" x 12").
- a disabled persons wheelchair access graphic symbol sign on the lift cab, 10.2 m x 10.2 m (4" x 4").

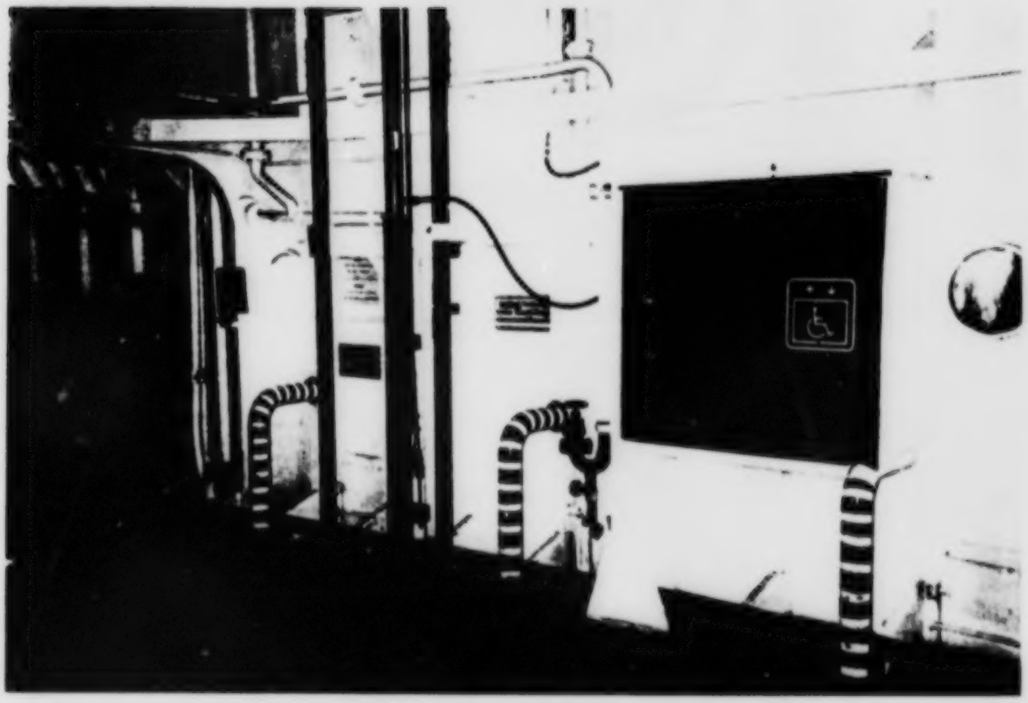


PHOTOGRAPH 7: VIEW OF THE INTERIOR OF THE LEVEL CHANGE SYSTEM AT THE PASSENGER DECK LEVEL

PHOTOGRAPH 8: VIEW OF THE LEVEL CHANGE SYSTEM OPERATING CONTROL PANEL AND KEYED SWITCH SYSTEM

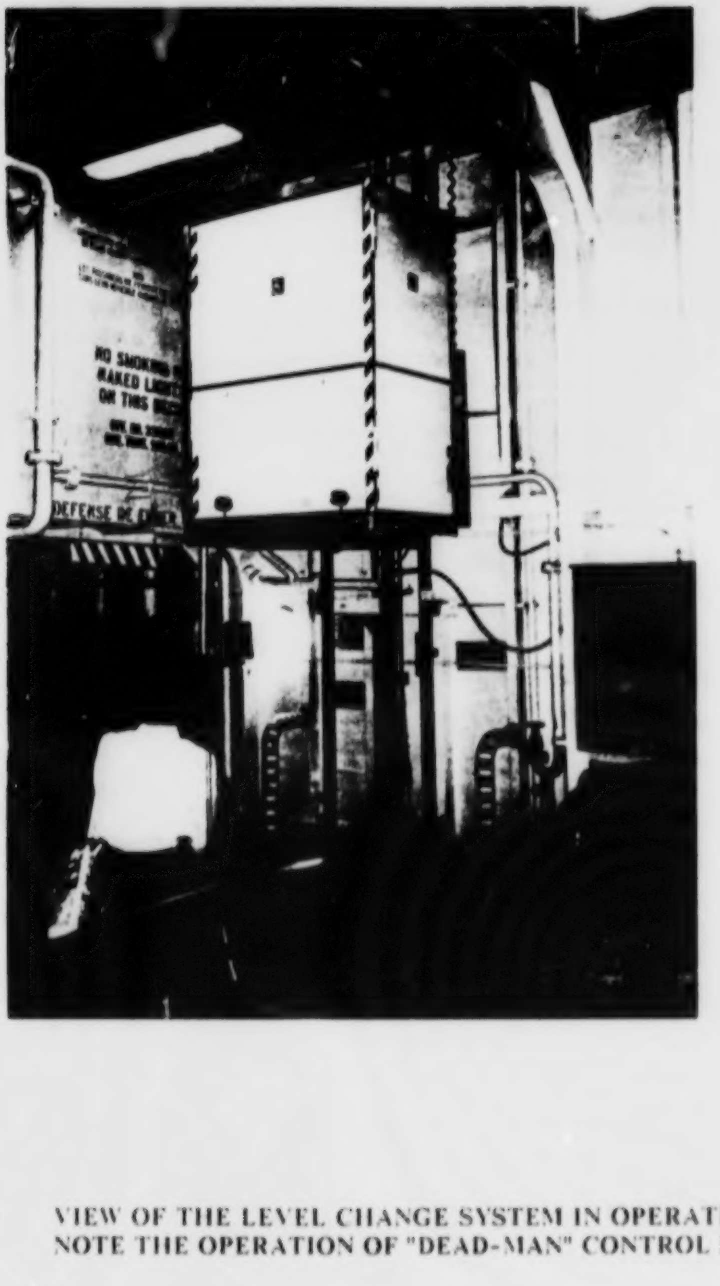


PHOTOGRAPH 9: VIEW OF THE LEVEL CHANGE SYSTEM COMPONENTS FROM THE CAR DECK



PHOTOGRAPH 10: VIEW OF THE LEVEL CHANGE SYSTEM COMPONENTS, SIGNS, "DEAD-MAN" CONTROL AND PORTABLE RAMP FROM THE CAR DECK

PHOTOGRAPH 11: VIEW OF THE PORTABLE RAMP POSITIONING FOR ENTRY/EXIT INTO OR FROM THE LEVEL CHANGE SYSTEM


NO SMOKING
NAKED LIGHT
ON THIS DEC
DEFENSE DE F

PHOTOGRAPH 12: VIEW OF THE LEVEL CHANGE SYSTEM IN OPERATION. PLEASE NOTE THE OPERATION OF "DEAD-MAN" CONTROL SYSTEM.

- elevator lettering and disabled persons wheelchair access graphic symbols 10.2 cm x 10.2 cm (4" x 4"), installed on the passenger deck leading from the rear lounge, the accessible door towards the lift trunk, and the lift trunk.

- cab operating instructions, installed inside the lift, by the control panel.

- operating instructions for locking/unlocking elevator (parking brake procedures) installed in the lift by the control panel.

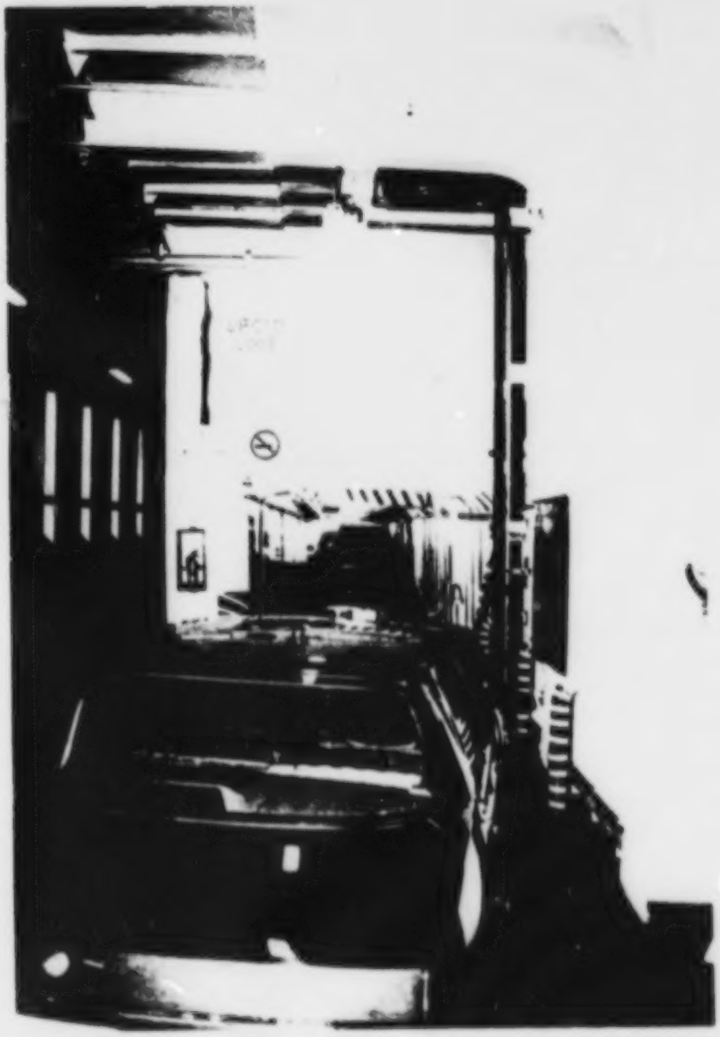
- emergency operation instructions, installed in the lift, by the control panel.

- lift capacity designation, installed in the lift, by the control panel.

- warning signs below the lift, mounted on the ships side, warning passengers, attendants not to stand or be located under the lift when the operating lights are flashing and the audible signal is on.

Photographs #6, #8, #9, #10, #11, #12, and #13 contain views of the:

- disabled persons wheelchair elevator graphic signs and their locations,
- audio/visual alarm system,
- "Dead-Man" controls,
- plywood pump/motor controller lockable enclosure and the disabled persons wheelchair elevator graphic sign,
- usage/operation/maintenance and warnings signs.



PHOTOGRAPH 13: VIEW OF THE PARKED VEHICLES ON THE CAR DECK AND THE LEVEL CHANGE SYSTEM

4.0 FUNCTIONAL TESTING/COMMISSIONING

Following completion of the installation, the system was tested to evaluate and document its performance and safety.

The functional test/commissioning plan was structured to evaluate all possible operation scenarios. These scenarios include failsafe operation, power failures, running clearances, ascent and descent speeds, possible jamming and pinching situations, operation of all controls, safety devices, door interlocks, adjustable limit switches and alarm systems. The plan also contains evaluation procedures to determine the ease of entry/exit for a wheelchair occupant and an attendant, at both the vehicle and passenger decks. The levels of obstruction, door opening forces, access to handrails and general lighting levels and appearance were also assessed.

To aid in the evaluation, a checklist of all the evaluations and measurements to be performed was produced.

The following describes in detail the test procedures and operations that were performed for the functional testing/commissioning process.

1. Post Installation, Pre Start-Up Checks

The following checks were performed before the lift was operated.

a) Torque on all fasteners was checked.

b) The running clearances were measured and recorded.

c) The actual ascent and descent speed was measured. (A measurement of total travel distance and the time required is adequate for speed verification.)

d) A weight test was performed in conformance with Concord Elevator's procedures and performance requirements.

e) A safety test, as per Concord Elevator's test procedures, was performed.

2. Wheelchair Entry/Exit Tests

These tests were performed with a wheelchair occupant and an attendant. The lift and ramp were prepared at the car deck. It was proposed that at least three trials of entry and exit with the wheelchair moving in a forward and rearward configuration at the vehicle deck and also at the passenger level be performed. The ease of maneuverability on the ramp, and through all doors and passageways was evaluated, with no problems found.

3. Door Operation

The operation of all doors was evaluated, while being used by the wheelchair occupant and the attendant. The following parameters were evaluated:

- door forces;
- handle locations, ease of operation;
- latching system operation;
- door dimensions;
- door access path;
- door interlock operation;
- levels of obstruction.

4. Handrail Access

The lift handrails were evaluated for location and usefulness for the wheelchair occupant and attendant. Basic measurements of height, diameter and distance from the lift wall were taken.

5. Ramp Evaluation

The lift ramp was evaluated for the following parameters:

- storage location;
- removal/storage of ramp from storage location;
- positioning of ramp by the lift, ease of positioning;
- ramp accessibility.

6. Attendant Operation of Controls

The operation of the lift controls was evaluated by the attendants. The following parameters were evaluated:

- ease of operation, understanding;
- labelling of controls, adequacy;
- safety of control system.

7. Limit-Switches, Alarm, Emergency Stop

The operation of the limit switches, alarm and emergency stop system was evaluated by the attendant and the wheelchair passenger. The accuracy of the limit switches was evaluated by moving the lift up and down several times and measuring the upper and lower stopping locations.

The emergency stop function was tested several times during the up and down lift travel. During the above operations the alarm system was evaluated for loudness and visual brightness, as well as the frequency.

8. Lighting System

The levels of lighting in the lift and in the passenger deck trunk were evaluated. In addition a power failure was simulated in order to evaluate the battery backup light system.

9. Emergency Lowering System

A power failure was simulated so that the emergency lowering system could be evaluated. The system was lowered normally and the time and ease of operation was evaluated.

10. Audio-Visual Warning System

The noise level of the audible alarm was evaluated, as was the colour, brightness and cycling frequency of the visual alarm.

11. General Safety of Operation

The general safety of operation was evaluated with the help of the wheelchair occupant and the attendants. The "Dead Man" System Operation was evaluated several times to ensure proper operation and to ensure that no confusion is present between the attendants during the operation of the lift system.

The view of clear descent was evaluated and any view obstructions noted. The overall operation of the controls was evaluated, with total safety and ease of use in mind.

The following checklist details the results of the testing/commissioning activities that were performed on the lift system before it was allowed to be put into a service status.

FUNCTIONAL TESTING/COMMISSIONING CHECKLIST

ITEM	OPERATION	COMMENTS
1. All Fasteners	Verify adequate torques on all fasteners.	All fastener torques were verified.
2. Running Clearance	Measure the running clearance for the lift.	The running clearance at the bottom left (outside) corner was 1.27 cm, and at the bottom right corner, (the corner closest to the ship's side) 1.11 cm. At the top left and right corners the running clearance was 0.95 cm. (Max. clearance allowed 1.5 cm)
3. Weight Test	Perform a weight test as per Concord test procedure.	A total weight of at least 567 kg (1250 lbs) was placed in the lift. The safety brakes activated within 20 mm of lift travel, and held the lift at that position.
4. Lift Speed	Measure the actual lift ascent/descent speed with a passenger and attendant.	The measured ascent and descent speed was 15.98 cm/sec.
5. Safety Device Test	Perform the Safety Device Test as per Concord test procedure.	The safety brakes, passed all requirements.

ITEM	OPERATION	COMMENTS
6. Wheelchair Entry/Exit Tests	3 Tests of Entry - Forward - Reverse 3 Test of Exit - Forward - Reverse (Evaluation of any obstructions)	No obstructions were observed for forward and reverse entry and exit manoeuvres. Good maneouverability between all doors of the lift was observed and recorded. An attendant assisted the wheelchair passenger at all times.
7. Door Operation /Access	Door Operation	
	- Force	Acceptable
	- Handle location	Acceptable
	- Latching system	Acceptable
	- Door dimensions	Acceptable
	- Clear path access	Acceptable
	- Door interlock operation	Acceptable
	- Levels of obstruction	Acceptable
8. Handrail Access	Wheelchair Occupant Handrail Access	
	- Handrail height	84.5cm to centerline
	- Diameter	8.9cm x 1.91cm
	- Distance from wall	2.54cm
	- Appearance	Acceptable
9. Ramp Evaluation	- Ramp positioning	Acceptable
	- Ramp storage	Acceptable
	- Ramp accessibility	Acceptable
	- Ramp appearance	Acceptable
		(Performed at a later date when ramp was finished)
10. Attendant Operation of Controls	- Ease of operation	Acceptable, some difficulties experienced with the application of the brake system
	- Labelling	Acceptable
	- Safety	Acceptable
11. Limit Switches, Emergency Stop, Alarm Bell	- Accuracy of limit switches (3 Tests)	Acceptable, exact return to top and lower positions
	- Function of emergency stop/start up (3 Tests)	Acceptable
	- Audio/visual alarm operation	Acceptable

ITEM	OPERATION	COMMENTS
12. Lighting System	- Visual check at both levels - main deck and promenade deck - Power failure condition - Battery back-up for lighting	Acceptable Acceptable light output Operational
13. Emergency Lowering System	- Functionality of automatic emergency lowering system - Mechanical lowering system	Acceptable Acceptable
14. Audio-Visual Warning System	- Audio signal levels - Visual signal brightness, colour, frequency	Acceptable Acceptable, yellow flashing lights, approximately 1 second on-off intervals
15. Safety of Operation	- "Dead Man" system operation (2 attendants) - Operation of controls - Clear view of descent path	Acceptable Acceptable, some improvements in the brake control system could be beneficial for attendants Acceptable

In general the system passed all of the requirements of the functional testing and commissioning.

5.0 OPERATOR TRAINING AND DEVELOPMENT OF AN OPERATING AND MAINTENANCE MANUAL

A thorough Operation and Maintenance Manual was developed, based on the specific system designed and installed on board the MV Prince Edward. This manual is included as Appendix E. The main objective of this manual was to provide procedures for the safe operation and maintenance of the lift system.

The manual contains a complete system description and operating instructions in enough detail to allow a trained operator to understand and be able to utilize the manual successfully for day to day and emergency operation.

All sections of the Operating Manual were covered during operator training. All of the general instructions and system controls were reviewed, discussed and operated several times. Before the training session proceeded to actual operation of the system, it was ensured that the operators understood the function and operation of all system components and controls.

Once a sufficient level of understanding of system operation and control was demonstrated, the operators were instructed on proper operation of the deck and cab controls. This included the operation of the "Dead-Man" car control button, the main power (keyed) switch and up and down cab control buttons, parking brake, emergency button, manual lowering drive, park key switch, door interlocks and cab sliding door switch.

All potential scenarios were discussed and operator system operation sequences were verified, corrected as necessary, and repeated until correct sequential procedures were followed.

Procedures were recommended for short term and long term storage of the system. Basic troubleshooting instructions were also included in the manual.

In addition a detailed copy of an installation manual for Concord elevator and lift systems was shipped to Northumberland Ferries for their reference. However, it has been strongly advised that only qualified and authorized elevator service personnel should perform service on the lift system.

Basic maintenance procedures have also been provided. The recommended interval between servicing of the lift system is 6 to 12 months depending on the amount of usage. The manual recommends that the servicing outlined be performed by an authorized service technician.

A sample contract for maintenance on the lift by the installation company has also been provided.

Finally, a list of contacts has been provided for the user, Northumberland Ferries, so that any problems with the lift system could be quickly resolved.

6.0 EVALUATION

6.1 EVALUATION PLAN

An evaluation plan was developed. The main objective of the evaluation plan was to monitor the lift system performance and overall safety. The acceptance and rating of the system by the passengers, and the acceptance, safety, and ease of use by the attendants, were of equal importance. The end result expected was actual in-use information that would indicate any safety or operational problems.

Some of the areas of concern to be addressed in the evaluation and questionnaire were as follows:

- the process and ease of lift system operation by the attendants;
- the process and ease of access to and onto the lift system with the aid of the portable ramp;
- the appearance and performance of the lift system between the two deck levels;
- the reliability and maintainability of the lift system;
- the acceptance of the lift system by the attendants and the passengers;
- total safety of the lift system for the attendants and for the passengers.

Several approaches and methods were considered and analyzed. It was decided to use a separate questionnaire for the passengers and the attendants. The logistics of controlling the questionnaires were as follows:

- the questionnaire for the attendants would be handed out by the ship's captain on a regular basis. Once a week was recommended for the attendants that have operated the lift system or assisted in the transfer of passengers between the deck levels. The questionnaire would be mailed back once a week, in the self-addressed and prepaid postage envelopes provided;
- the passenger questionnaires were stored in a pouch by the lift system entrance/exit. Each passenger was provided a questionnaire if they indicated that they would be interested in filling one out. A prepaid, self-addressed envelope was provided.

The questionnaires were structured so that the most important human factors and lift system mechanical and electrical factors could be evaluated, based on the passengers' and attendants' responses. A sample copy of both of the questionnaires is included in Appendices F1 and F2.

6.2 CONDUCT OF EVALUATION

The evaluation was conducted as planned. Each passenger that used the lift system was asked if they were interested in filling out a questionnaire on the lift system. The questionnaire was provided with a self-addressed envelope with prepaid postage.

The attendant questionnaire was also conducted as planned. The attendants were asked to fill out one questionnaire, once a week, if they operated the lift system during that week.

One site visit by DAVIS and TDC was made to re-evaluate the lift system and to obtain first hand comments from the lift operators and users.

In addition a "mystery rider" evaluation of the lift system including operation was performed. A "mystery rider" evaluation consists of using pre-instructed passengers to evaluate the overall system performance. The aim of this evaluation was to obtain customer satisfaction information on the new lift system by the use of "mystery riders", wheelchair users who travelled anonymously and reported on their experiences.

6.3 EVALUATION RESULTS

The completed questionnaires received from the passengers and attendants were compiled and analyzed. To simplify analysis, all of the answers to the questions that could be averaged, were averaged. Table 6.1 contains the passenger questionnaire results. Based on the overall averaged results from the passenger questionnaires the following can be summarized as being of concern or as low on the satisfaction level:

- The passengers would prefer a larger lift system.
- Additional signs indicating a lift service for disabled passengers would be appreciated.

Very high satisfaction levels were expressed for all other areas addressed in the questionnaire. Figure 6.1 provides a plot of the passenger questionnaire results that have been averaged. Presented are the averages and the standard deviations of the relevant question answers. The questionnaire results are included in Appendices G1 and G2. The passengers' comments were for the most part similar to each other, with the following common statements.

- small but efficient
- courteous attendants
- much preferred to taking stairs or having to be carried up the stairs
- all ferries should have this system
- more signs needed

In general the passengers considered that this system provided excellent level change service, which was safe and enjoyable. One comment that was widely made was that all ferries presently in service should have a system similar to this level change system.

The following can be summarized from the attendant questionnaires as being of concern or as rated low on the satisfaction level:

QUESTION	RATING	AVERAGE	STANDARD DEVIATION	NUMBER OF RESPONSES
1. Sex	1 Male 2 Female	1.75	0.43	10 30
Age Category	1 Under 25 2 25 - 45 3 45 - 65 4 65 +	3.11	0.99	3 9 9 18
2. Height	1 under 5' 2 5' to 5'3" 3 5'3" to 5'6" 4 5'6" to 5'10" 5 5'10" to 6'2" 6 over 6'2"	2.89	0.91	1 13 18 4 3 0
3. Weight	1 under 150 lbs 2 150 to 200 lbs 3 over 200	1.63	0.89	16 18 5
4. How Often do you use a mobility aid?	1 Never 2 3 Sometimes 4 5 Always	3.68	1.43	5 3 10 4 18
4. Are you using a mobility aid on this trip?	1 Yes 2 No	1.18	0.4	32 8
4. If yes, please check all of the aids that apply to you.	1 Manual Wheelchair 2 Electric Wheelchair 3 Scooter 4 Cane 5 Dog 6 Crutches 7 Other	2.38	1.55	13 3 1 10 0 2 0
5. How would you rate the passenger lift system's effectiveness in facilitating the access to the passenger deck of the ferry?	1 Poor 2 3 4 5 Excellent	4.44	0.92	0 3 2 8 26

TABLE 6.1 PASSENGER QUESTIONNAIRE RESULTS (SHEET 1 OF 3)

QUESTION	RATING	AVERAGE	STANDARD DEVIATION	NUMBER OF RESPONSES
6. How would you rate the interior appearance of the lift system?	1 Poor	4.30	0.87	0
	2			1
	3			7
	4			9
	5 Excellent			20
7. How would you rate the exterior appearance of the lift system?	1 Poor	4.05	1.09	1
	2			3
	3			6
	4			10
	5 Excellent			17
8. How would you rate your ride comfort while using the lift?	1 Uncomfortable	4.26	0.91	0
	2			1
	3 Adequate			9
	4			7
	5 Very Comfortable			21
9. How would you rate the ease of changing levels between the car deck and passenger deck with the lift?	1 Difficult	4.33	0.89	0
	2			1
	3 Adequate			8
	4			6
	5 Very easy			23
10. How would you rate the placement of hand rails?	1 Inconvenient	4.33	1.03	1
	2			1
	3			6
	4			5
	5 Convenient			23
11. How would you rate the system's accommodation for your mobility aid (ie. wheelchair, cane, walker, etc.)?	1 Poor	4.03	1.16	2
	2			2
	3 Acceptable			7
	4			9
	5 Excellent			18
12. Do you find the motion (if any) of the lift system excessive while in operation?	1 Excessive	4.50	0.81	0
	2			1
	3 Acceptable			5
	4			7
	5 Very Smooth			25
13. How important is it to be able to see out of the passenger lift system during the ride?	1 Not Important	2.10	1.46	23
	2			3
	3			5
	4			3
	5 Very Important			6

TABLE 6.1 PASSENGER QUESTIONNAIRE RESULTS (SHEET 2 OF 3)

QUESTION	RATING	AVERAGE	STANDARD DEVIATION	NUMBER OF RESPONSES
14. How safe did you feel during the transfer process?	1 Not Safe 2 3 Safe 4 5 Very Safe	4.46	0.86	0 1 7 4 28
15. How would you rate the interior size of the lift system?	1 Too Small 2 3 Just Right 4 5 Too Large	2.34	0.85	9 9 21 1 0
16. How would you rate the amount of interior lighting?	1 Too Little 2 3 Just Right 4 5 Too Bright	2.96	0.35	1 0 38 1 0
17. Do you find the type and location of signs identifying and directing lift users to and from the lift adequate, clear and easily understood.	1 Not Adequate 2 3 Adequate 4 5 Excellent	3.07	1.24	5 5 18 2 8
18. Would you be more or less likely to use a ferry system if a lift system is available?	1 Less Likely 2 3 No Change 4 5 More Likely	4.55	0.95	1 0 7 0 32
19. Have you ever been assisted while changing deck levels on a ferry in the past?	1 Yes 2 No	1.29	0.45	23 15
19. If Yes, please describe the methods other than the current one that were used to assist in moving from one deck level to another.	1 Lift 2 Other	1.18	0.39	10 3

TABLE 6.1 PASSENGER QUESTIONNAIRE RESULTS (SHEET 3 OF 3)

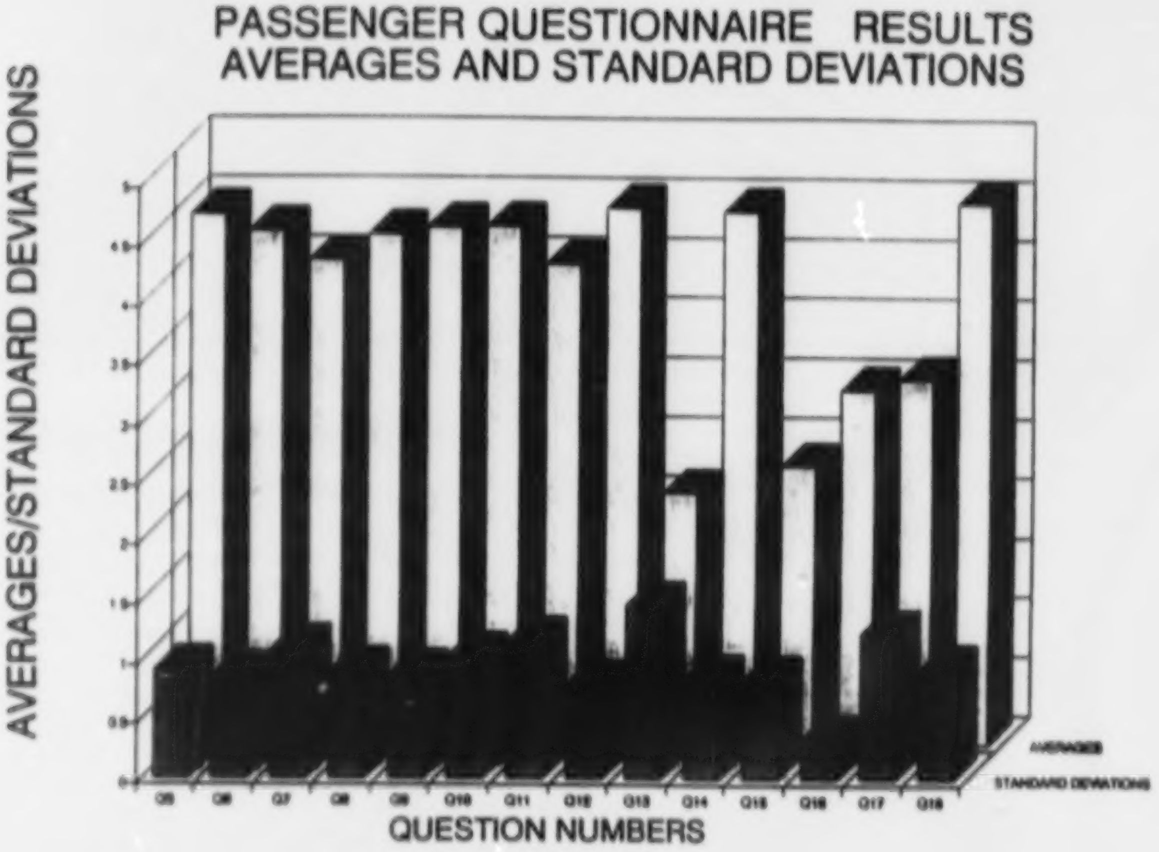


FIGURE 6.1 PLOT OF PASSENGER QUESTIONNAIRE RESULTS - AVERAGES AND STANDARD DEVIATIONS

- the attendants would prefer a larger lift size.
- the attendants would prefer an easier ramp storage system.

Very high satisfaction levels were expressed for all other questions in the questionnaire.

Table 6.2 contains the questionnaire results. Figure 6.2 provides a plot of attendants' questionnaire results - averages and standard deviations of the relevant question answers. The comments from the attendants indicated that:

- the lift system was much preferred over having to carry disabled passengers up/down the stairs.
- ramp positioning/storing is a nuisance.
- attendants would prefer a larger lift system.

One concern and recommendation for the level change system has been presented by one of the attendants. This attendant felt that, even with proper training on the use of the level change system, a remote potential of accidental injury to an attendant operating the lift was present, because an attendant could force his or her fingers or hand through the approved folding door. The request was made to determine if this potential of injury could be lowered or eliminated.

The level change system on board the MV Prince Edward Ferry was also evaluated by representatives of the National Transportation Agency of Canada. The representatives travelled to the Wood Islands Terminal, but at their time of arrival the MV Confederation was in port instead of the MV Prince Edward. The group did review the detailed design drawings, and the photographs and a video of the finished system in operation. Their evaluation is presented in a National Transportation Agency of Canada Interim Report of the Inquiry into Level of Accessibility of Ferry Services, January 17, 1992, File # 2315-7. This report highly recommended that all efforts should be made to provide more ferries with systems that would render the ferries accessible. The MV Prince Nova, a sister vessel of the MV Prince Edward, was highly recommended for fitment by May 1992 with the same level change system that has been installed on board the MV Prince Edward. The cost of this retrofit would be considerably less than for the MV Prince Edward, since the two ships are almost identical.

QUESTION	RATING	AVERAGE	STANDARD DEVIATION	NUMBER OF RESPONSES
1. Sex	1 Male 2 Female	1.11	0.31	9 1
Age Category	1 Under 25 2 25 - 45 3 45 - 65 4 65 +	1.33	0.47	6 4 0 0
2. Height	1 under 5' 2 5' to 5'3" 3 5'3" to 5'6" 4 5'6" to 5'10" 5 5'10" to 6'2" 6 over 6'2"	4.20	1.25	1 0 0 5 3 1
3. Weight	1 under 150 lbs 2 150 to 200 lbs 3 over 200	1.89	0.57	3 6 1
4. What percentage of your time at work is spent assisting elderly or handicapped passengers for the purpose of changing deck levels?	1 under 25% 2 25% to 50% 3 50% to 75% 4 over 75%	1.11	0.31	9 1 0 0
5. Current Job Title and responsibility.	1 Deckhand 2 Mate	1.11	0.31	9 1
6. Have you ever operated this lift system previous to this time?	1 Yes 2 No	1.25	0.43	7 3
6. If YES, please list the number of times you operated the lift from the cab?	N/A	13.71	12.77	7

TABLE 6.2 ATTENDANT QUESTIONNAIRE RESULTS (SHEET 1 OF 6)

QUESTION	RATING	AVERAGE	STANDARD DEVIATION	NUMBER OF RESPONSES
6. Please list the number of times you operated the lift from the deck.	N/A	6.86	7.64	7
7. How would you rate the passenger lift system's effectiveness in facilitating access between the main and passenger decks?	1 Poor 2 3 Adequate 4 5 Excellent	3.95	0.57	0 0 2 6 2
8. How would you rate the appearance of the lift system?	1 Poor 2 3 Adequate 4 5 Excellent	3.70	0.78	0 1 2 6 1
9. How would you rate the ride comfort?	1 Uncomfortable 2 3 Comfortable 4 5 Very Comfortable	3.65	0.84	0 0 5 3 2
10. How would you rate the ease of assisting a disabled passenger to enter and exit the lift?	1 Awkward 2 3 Easy 4 5 Excellent	3.44	0.96	0 1 5 1 2
11. How would you rate the placement of hand rails.	1 Poor 2 3 4 5 Excellent	3.05	1.27	2 1 2 4 1
12. How would you rate the ease of door opening and closing?	1 2 3 4 5			

TABLE 6.2 ATTENDANT QUESTIONNAIRE RESULTS (SHEET 2 OF 6)

QUESTION	RATING	AVERAGE	STANDARD DEVIATION	NUMBER OF RESPONSES
13. How would you rate the system's accommodation for mobility aids (*i.e.*, wheelchair, can, walker, etc.)?	1 Inadequate 2 3 Adequate 4 5 Excellent	3.15	0.90	0 2 5 2 1
14. Do you find the motion passenger lift system smooth?	1 Not Smooth 2 3 Smooth 4 5 Very Smooth	3.50	0.50	0 0 5 5 0
15. How would you rate the visibility from within the lift system?	1 Poor 2 3 Adequate 4 5 Excellent	2.50	0.92	2 4 5 1 0
16. How comfortable are the passengers during the transfer process?	1 Uncomfortable 2 3 Comfortable 4 5 Very Comfortable	3.20	0.40	0 0 8 2 0
17. How would you rate the internal size of the lift system?	1 Too Small 2 3 Just Right 4 5 Too Large	2.00	0.77	3 4 3 0 0
18. How would you rate the amount of interior lighting?	1 Too Little 2 3 Just Right 4 5 Too Bright	3.10	0.30	0 0 9 1 0
19. How you find the temperature inside the lift system?	1 Too Cold 2 3 Just Right 4 5 Too Hot	3.22	0.63	0 0 8 0 1

TABLE 6.2 ATTENDANT QUESTIONNAIRE RESULTS (SHEET 3 OF 6)

QUESTION	RATING	AVERAGE	STANDARD DEVIATION	NUMBER OF RESPONSES
20. Are you more or less willing to accept the responsibility of assisting elderly and disabled passengers change deck levels with the lift system as compared to without the lift system?	1 Less Likely 2 3 No Change 4 5 More Likely	4.20	0.98	0 0 4 0 6
21. How clear is the communication system between the other operator and yourself.	1 Not Clear 2 3 Sufficient 4 5 Very Clear	3.30	1.10	0 3 3 2 2
22. How would you rate the control system in the lift for clarity of instruction?	1 Poor 2 3 Sufficient 4 5 Excellent	3.40	0.80	0 1 5 3 1
23. How would you rate the control system for ease of operation?	1 Poor 2 3 Adequate 4 5 Excellent	3.80	0.87	0 1 2 5 2
24. How would you rate the ease of positioning the portable ramp?	1 Poor 2 3 Adequate 4 5 Easy	3.11	0.74	0 2 4 3 0
25. How would you rate the ease of storing the portable ramp?	1 Poor 2 3 Adequate 4 5 Easy	2.89	0.57	0 2 6 1 0
26. How would you rate the total system reliability?	1 Poor 2 3 Adequate 4 5 Excellent	3.45	0.57	0 0 5 5 0

TABLE 6.2 ATTENDANT QUESTIONNAIRE RESULTS (SHEET 4 OF 6)

QUESTION	RATING	AVERAGE	STANDARD DEVIATION	NUMBER OF RESPONSES
27. How does the system operate under extreme weather conditions?	1 Poor 2 3 Adequate 4 5 Excellent	3.00	0.53	0 1 4 1 0
28. How is the system standing up to the corrosive environment relative to other ship systems?	1 Poor 2 3 Adequate 4 5 Excellent	3.38	1.11	1 0 3 3 1
29. How would you rate the access to the system at the car deck?	1 Poor 2 3 Adequate 4 5 Very Good	3.25	0.60	0 1 5 4 0
30. How would you rate the access to the system at the passenger deck?	1 Poor 2 3 Adequate 4 5 Very Good	3.44	0.96	0 2 2 4 1
31. How would you rate the instructional and operations signs provided?	1 Poor 2 3 Adequate 4 5 Excellent	3.30	0.78	0 1 6 2 1
32. How would you rate the extent to which a lift user disrupts normal boarding/disembarking procedures (as compared to assisting a person up the stairs)?	1 Much More Disruptive 2 3 Same as without lift system 4 5 Much Less Disruptive	4.10	1.04	0 1 2 2 5

TABLE 6.2 ATTENDANT QUESTIONNAIRE RESULTS (SHEET 5 OF 6)

QUESTION	RATING	AVERAGE	STANDARD DEVIATION	NUMBER OF RESPONSES
33. Have you ever assisted elderly and handicapped passengers to move between the car deck and the passenger deck in the past?	1 YES 2 NO	1.20	0.40	8 2
34. Which method is preferred, and why?	1 Lift 2 Other	1.00	0.00	7 0

TABLE 6.2 ATTENDANT QUESTIONNAIRE RESULTS (SHEET 6 OF 6)

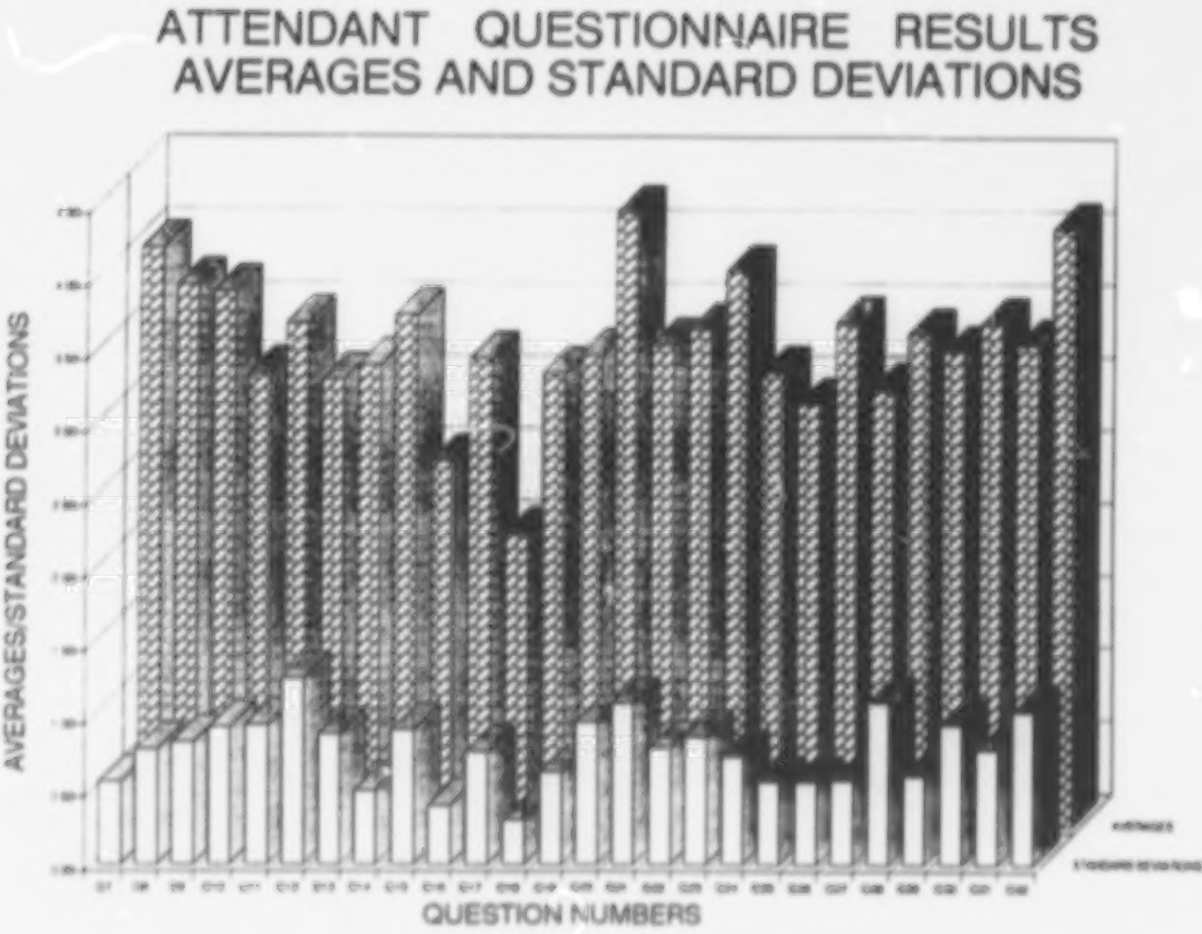


FIGURE 6.2 PLOT OF ATTENDANT QUESTIONNAIRE RESULTS - AVERAGES AND STANDARD DEVIATIONS

7.0 DISCUSSION

The design considerations as outlined in Section 2.0 have been followed and implemented during the design and manufacturing of the system. Conflicting requirements such as lift size and available vessel space for lift installation, and cost and appearance were balanced to provide an optimum design for the conditions present. The first design produced was a two component system, as based on the Phase I evaluations and results. This system consisted of a wheelchair lift and elevator. This system detailed design progressed to the stage of development and drafting of the ship interface drawings. These drawings were submitted for approval by the Canadian Coast Guard. This design was approved.

Upon further consideration of the design and overall system performance requirements, TC Marine Policy and Programs requested that a single lift system be developed. This system, of course, would also have to meet the Canadian Coast Guard regulations and safety requirements.

The design considerations such as :

- ensuring all safety standards and regulations are satisfied;
- minimizing the size of the lift system;
- optimizing the physical location of the lift system on board the MV Prince Edward;
- providing service for one attendant and one passenger;
- ergonomical acceptability;
- minimum cost; and
- ease of operation and maintenance.

were all used and considered in the overall system configuration. Trade offs such as minimum size and maximum comfort levels had to be balanced out. Special consideration was given to the overall safety of the system. Several special features were designed and installed on this level change system to meet the above stated requirements. Some of the major safety systems that have been provided with this system are:

- keyed control of the lift system, as well as a "dead man" control on the car deck to ensure that the lift system could not be lowered unless an operator was below the lift on the car deck to ensure that the descent path is clear;
- operation of the lift only when the doors and gate are closed;
- emergency stop buttons, flashing lights and audio signals to signal lift movement, and emergency situations;
- emergency lowering power supply, including manual operated emergency cab lowering valve;
- overspeed govenors to limit descent speed of the lift to 150% of rated speed;

- dual limit switches;
- emergency lights in the event of a power failure;
- power hook-up into the ships essential power grid;
- mechanical, fail safe brake system, and a mechanical parking brake system.

These systems have been included to ensure the utmost in operational safety. During the evaluation process, it was requested by one member of the crew to consider the possibility of modifying the existing folding gate design. The attendant's concern was for increased levels of safety with respect to the folding gate. The present folding gate meets the standards and regulations in effect, but there is room for improvement with respect to safety. The folding gate does not provide a solid barrier between the cab and the trunk of the level change system. As a result there is a possibility that an attendant might place a finger or fingers through the folding gate and be in the danger of scrapping, crushing, and causing personal injury to his/her fingers or hand. To remedy this situation it has been decided to provide and install a see-through folding door inside the folding gate, to provide a secondary door system to prevent accidental passage of attendants' fingers through the folding gate. This modification will be made before March 31, 1992.

The portable ramp and the passenger deck ramp had to be custom fit due to the camber of the deck. To minimize the slope of the portable ramp the lift system downward travel limit was adjusted to its maximum downward position. The ramp design was based on a balance of weight, length and slope. As a result a ramp design that requires the assistance of an attendant for disabled persons to go up or down the ramp with a manual or electric wheelchair was developed. This system is certainly feasible, but it has been indicated by the passengers and the attendants that a more efficient means to attain entry and exit to the lift at the car deck would be considered an improvement on the present system.

During the design and implementation stages the main concerns with the ramp design were considered and discussed. The most cost effective and feasible mode was selected. This was the portable ramp. Other more expensive and complex approaches to the problem of entry into and exit from the level change system on the car deck were considered. None of the more complex or expensive approaches were considered to be able to provide significant improvement in the entry into and exit out of the lift system.

The present ramp system evaluated is fully functional. It is to be determined if the small levels of discomfort warrant additional expense in designing and providing alternative designs for the portable ramp.

During the initial training period, it was indicated by several of the attendants that the present design of the parking brake system was not as simple to use as they thought could be the case, or not as easy to determine when the mechanism was actually in the full park position. This attendant-oriented deficiency was investigated and it was determined that although the parking brake system was fully functional, some hand dexterity and hand "feel" was required to move the parking brake control rod into the fully locked position, and to determine that it was in the fully locked position. For future designs of this system, the parking brake control rod setting sequence should be simplified, and the feedback on whether the control rod is fully engaged or not improved. During the operation of the level change system under low ambient temperatures, it has been documented that the lift would not travel upwards when a heavier load such as two personnel were put into the lift. This problem is being examined and it appears that the lift manufacturer has an immersion heater available that would improve the situation. The manufacturer has been contacted and requested to install the immersion heater into the hydraulic oil reservoir.

Signage requirements were identified and a signage content, location, size and colour plan was designed and developed. Signs that were commercially available were evaluated for compatibility with this project's requirements, as well their costs. In consultation with Northumberland Ferries, it was decided to allow some flexibility in the placement and selection of signage for the level change system, because the vessel operators already had a considerable number of other instructional signs, and the ship has to be painted once a year. To minimize the clutter of signs, and to facilitate the yearly painting requirements, the operators were left with some control as to where to position some of the signs. The signs considered as essential were located and installed. Instructions were given to the operators to maintain the signs as installed during the year and when maintenance tasks were under way.

Some overall comments are presented on maintenance and use of the level change system. It was noted during the evaluation period that the lift rails were not oiled when and as required. The rails should be oiled at time intervals depending on the amounts of use, and when the rails visibly require lubrication.

In addition, it has been noted that the level change system has been overloaded several times, and operation of the lift attempted. The safety features designed into the lift prevent the operation of the lift when it is overloaded. Efforts should be made by the operators not to overload the level change system.

Based on the above observed actions, it is recommended that Northumberland Ferries put into effect a short re-training program to refresh and reinstill the proper operating procedures for operators for the system.

No comments are being presented on the pre-boarding, parking and other activities that also make up the overall ferry service for disabled and elderly passengers. These areas are not a part of this project. It is recommended that Marine Policy and Programs Division of Transport Canada and Northumberland Ferries review the overall boarding and de-boarding procedures, to ensure that acceptable procedures are being used, and that the appropriate information is being made available to disabled and elderly travellers.

Some of the areas to consider are:

- The information made available during the initial phone call for information, reservations, ferry schedule, etc;
- Toll both parking and parking lot procedures and information;
- Car boarding and parking procedures;
- Deboarding;
- Crew training and performance.

8.0 CONCLUSIONS

The following conclusions are made with regard to the level change system:

The objectives and scope of this project have been met. A level change system for disabled persons on the federally subsidized vessel the MV Prince Edward has been successfully designed, manufactured, installed, commissioned and evaluated.

The level change system provides acceptable and pleasing level change service between the vehicle deck and the passenger deck for the disabled and elderly passengers. Very positive feedback has been obtained from both the passengers and the attendants on the performance of the level change system.

The level change system as installed on board the MV Prince Edward has been evaluated by the passengers as a very useful and safe system that provides a dignified and convenient means to move between the vehicle and passenger decks.

9.0 RECOMMENDATIONS

The following recommendations are presented on the level change system installed on the MV Prince Edward:

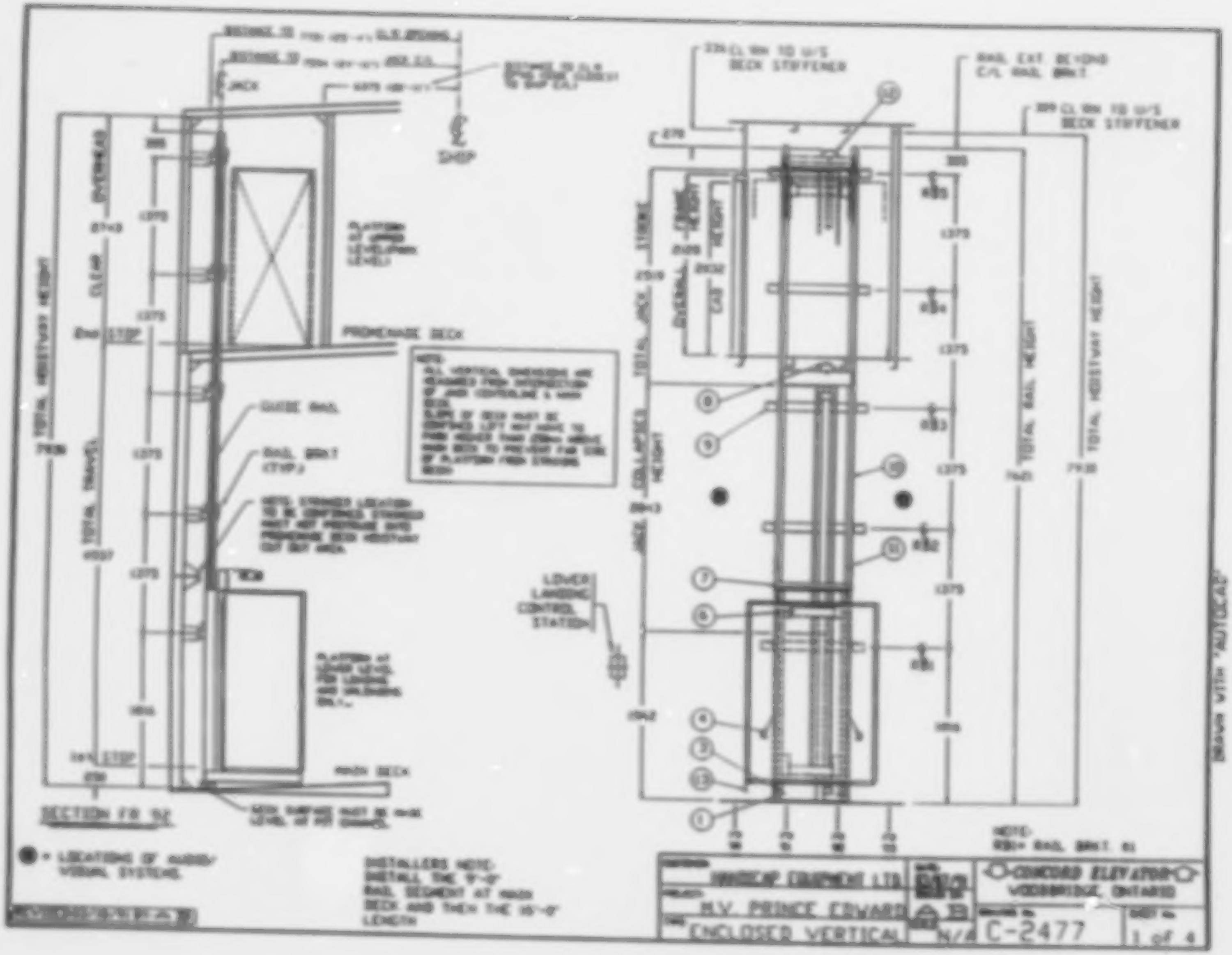
- See-through, solid folding doors or solid folding gates should be provided for subsequent level change systems if this type of system is issued.
- Consideration should be given to making the ramp lighter or providing automatic operation of the ramp.
- Consideration should be given to decreasing the ramp slope.
- On-going attendant training should become a part of the regular ferry training program.
- Northumberland Ferries should ensure that the lift system is maintained through the operating season, and is serviced at least once a year by a qualified lift service technician.
- An oil heater type device should be used in new systems to ensure consistent operation under low temperature ambient conditions.

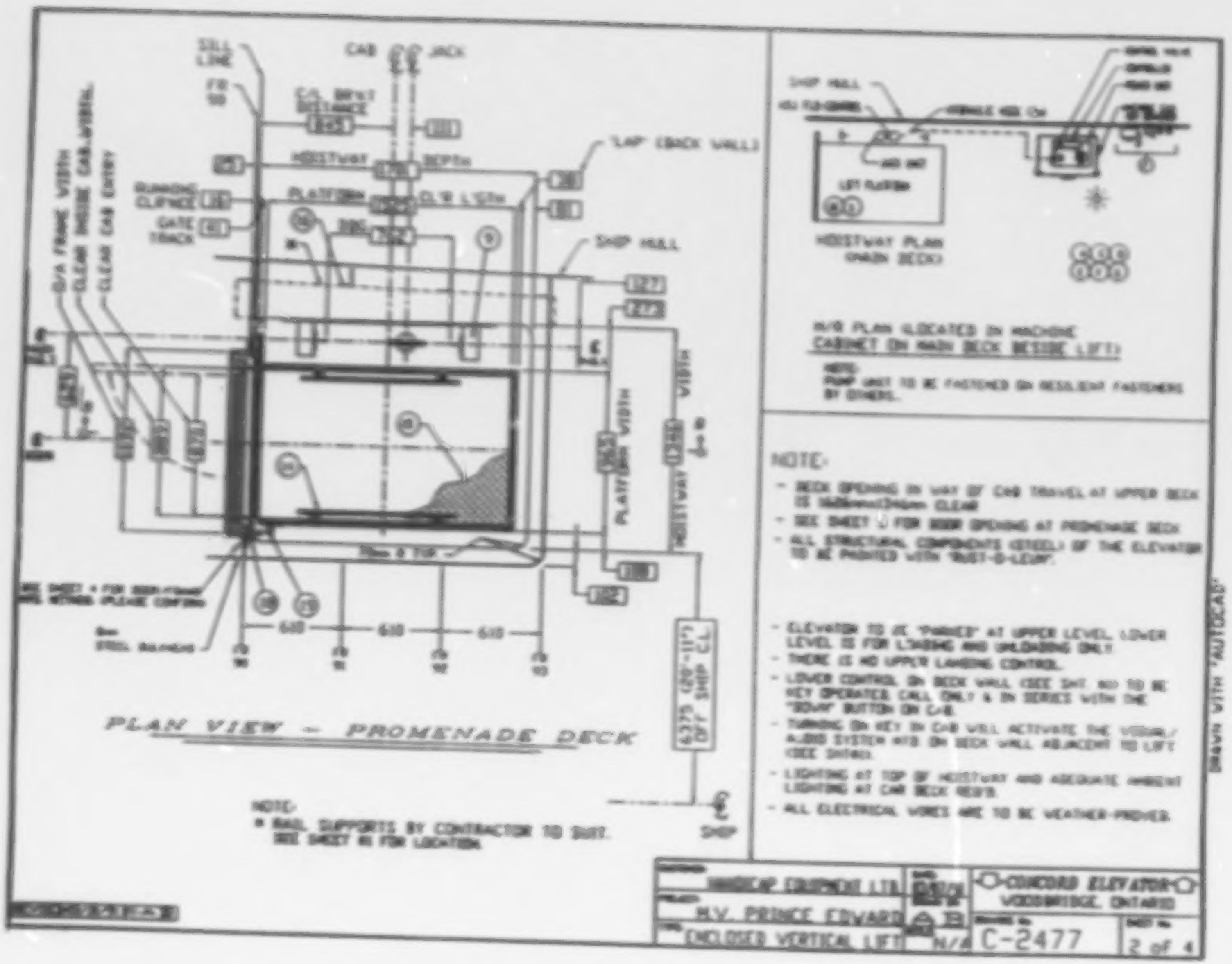
The following recommendations are provided on ferry services in general:

- Northumberland Ferries and Transport Canada should coordinate all pre-boarding, boarding and de-boarding information and logistic activities.
- All federally subsidized ferries presently in service should be fitted with a level change system.
- Other on-board accessibility features should be reviewed.
- The needs of persons with sensory disabilities should be reviewed.
- Over all signage of accessibility features should be reviewed/evaluated.

APPENDIX A

LIFT SYSTEM MANUFACTURING DRAWINGS


JACK
SHIP
PROMENADE DECK
MAIN DECK
GUIDE RAIL
RAIL BRKT (TYP.)
2nd STOP
1st STOP
TOTAL HOISTWAY HEIGHT
TOTAL TRAVEL
CLEAR OVERHEAD
1375
300
SECTION FR 92
LOCATIONS OF AUDIO/VISUAL SYSTEMS
INSTALLERS NOTE:
INSTALL THE 9'-0"
RAIL SEGMENT AT MAIN
DECK AND THEN THE 15'-0"
LENGTH
DECK STIFFENER
RAIL EXT. BEYOND C/L RAIL BRKT.
TOTAL JACK STROKE
JACK COLLAPSED HEIGHT
OVERALL FRAME HEIGHT
CAB HEIGHT
TOTAL RAIL HEIGHT
LOWER LANDING CONTROL STATION
NOTE:
HANDICAP EQUIPMENT LTD.
M.V. PRINCE EDWARD
ENCLOSED VERTICAL
N/A
CONCORD ELEVATOR
WOODBRIDGE, ONTARIO
C-2477
1 of 4
DRAWN WITH "AUTOCAD"


SILL LINE
CAB
JACK
C.L. BR'KT DISTANCE
HOISTWAY DEPTH
PLATFORM CL'R L'GTH
RUNNING CLR'NCE
GATE TRACK
O/A FRAME WIDTH
CLEAR INSIDE CAB.WIDTH
CLEAR CAB ENTRY
"LAP" (BACK WALL)
SHIP HULL
PLATFORM WIDTH
HOISTWAY WIDTH
6375 (20'-11") OFF SHIP C.L.
SHIP
610
610
610
HOISTWAY PLAN (MAIN DECK)
LIFT PLATFORM
SHIP HULL

PLAN VIEW — PROMENADE DECK

NOTE:
- RAIL SUPPORTS BY CONTRACTOR TO SUIT. SEE SHEET [illegible] FOR LOCATION.

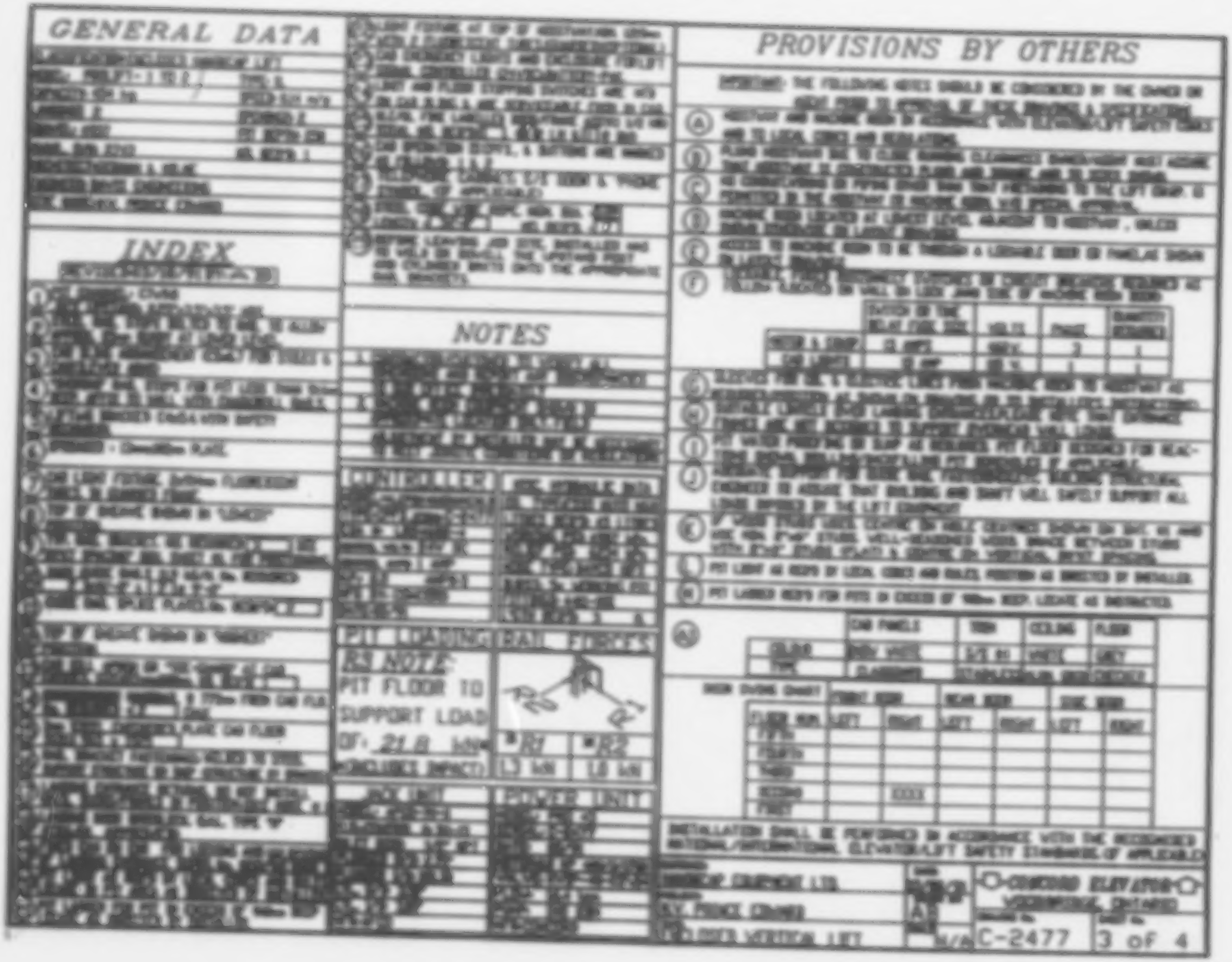
M/O PLAN (LOCATED IN MACHINE CABINET ON MAIN DECK BESIDE LIFT)

NOTE:
PUMP UNIT TO BE FASTENED ON RESILIENT FASTENERS BY OTHERS.

NOTE:
- DECK OPENING IN WAY OF CAB TRAVEL AT UPPER DECK IS [illegible] CLEAR
- SEE SHEET [illegible] FOR DOOR OPENING AT PROMENADE DECK
- ALL STRUCTURAL COMPONENTS (STEEL) OF THE ELEVATOR TO BE PAINTED WITH "RUST-O-LEUM".
- ELEVATOR TO BE "PARKED" AT UPPER LEVEL. LOWER LEVEL IS FOR LOADING AND UNLOADING ONLY.
- THERE IS NO UPPER LANDING CONTROL.
- LOWER CONTROL ON DECK WALL (SEE SHT. [illegible]) TO BE KEY OPERATED, CALL ONLY & IN SERIES WITH THE "DOWN" BUTTON ON CAB.
- TURNING ON KEY IN CAB WILL ACTIVATE THE VISUAL/AUDIO SYSTEM [illegible] ON DECK WALL ADJACENT TO LIFT (SEE SHT[illegible]).
- LIGHTING AT TOP OF HOISTWAY AND ADEQUATE AMBIENT LIGHTING AT CAR DECK REQ'D.
- ALL ELECTRICAL WIRES ARE TO BE WEATHER-PROOFED.

HANDICAP EQUIPMENT LTD.
M.V. PRINCE EDWARD
ENCLOSED VERTICAL LIFT
N/A
CONCORD ELEVATOR
WOODBRIDGE, ONTARIO
C-2477
2 of 4

DRAWN WITH "AUTOCAD"



GENERAL DATA

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PIT LOADING

PIT FLOOR TO SUPPORT LOAD OF: 21.8 kN (INCLUDES IMPACT)

RAIL FORCES

PROVISIONS BY OTHERS

C-2477

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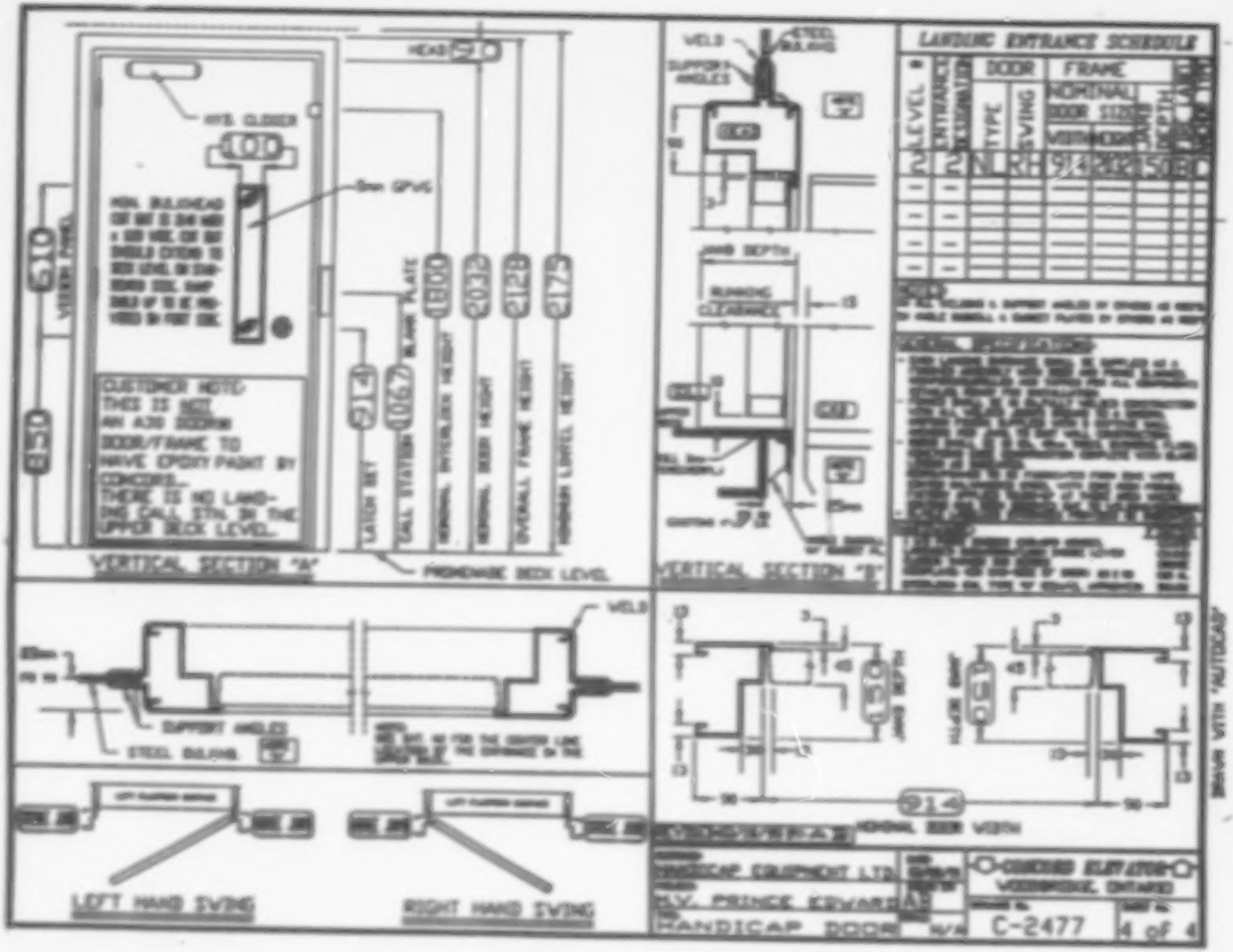
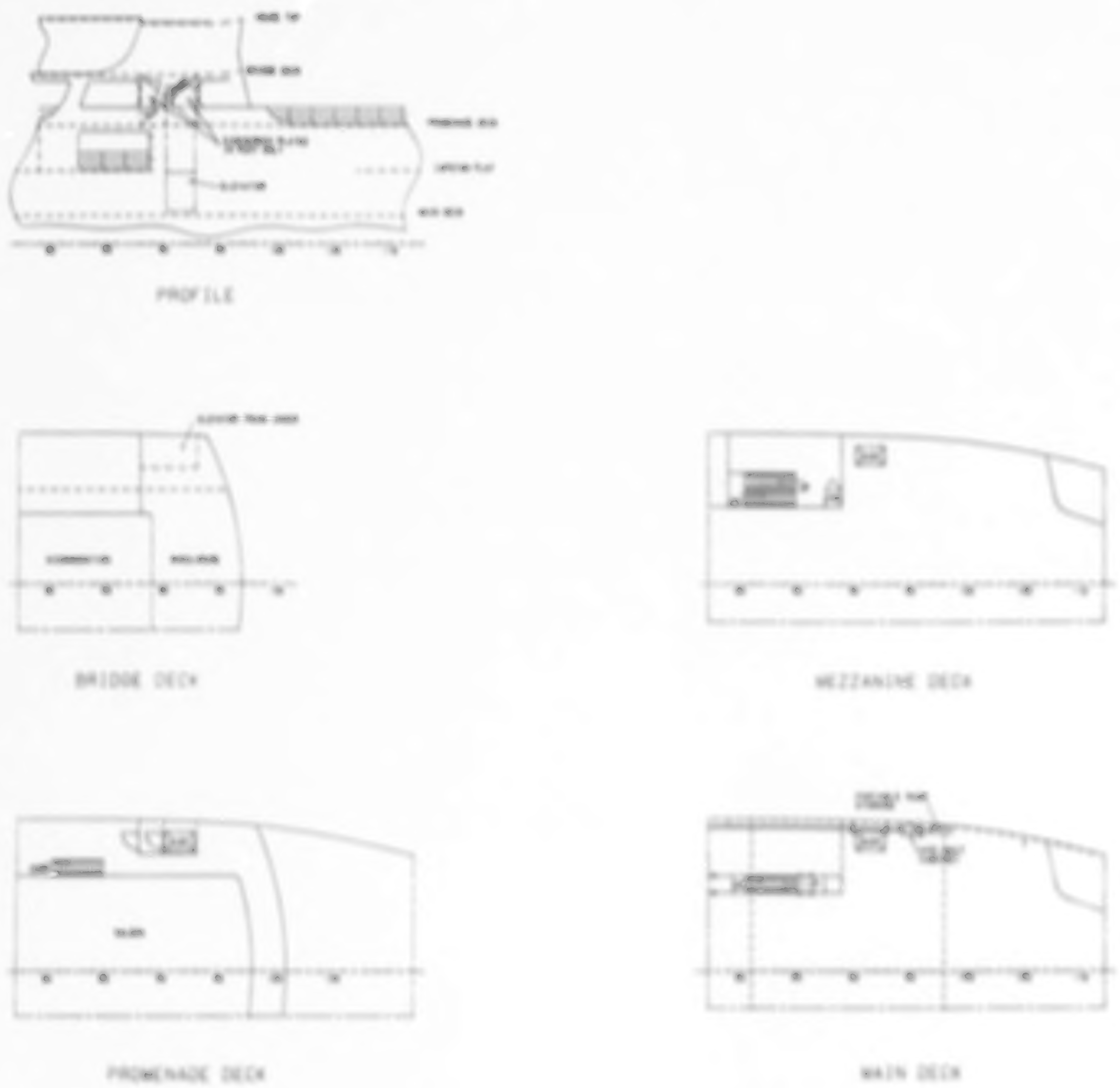

VERTICAL SECTION "A"
VERTICAL SECTION "B"
LEFT HAND SWING
RIGHT HAND SWING
LANDING ENTRANCE SCHEDULE
LEVEL #
ENTRANCE DESIGNATION
DOOR
TYPE
SWING
FRAME
NOMINAL DOOR SIZE
WIDTH
HEIGHT
JAMB DEPTH
2
2
NL
RH
914
2032
150
CUSTOMER NOTE:
THIS IS NOT
AN A30 DOOR
DOOR/FRAME TO
HAVE EPOXY PAINT BY
CONCORD.
THERE IS NO LANDING CALL STN. IN THE
UPPER DECK LEVEL.
HYD. CLOSER
100
610
VISION PANEL
850
914
LATCH SET
1067
CALL STATION BLANK PLATE
1800
NOMINAL INTERLOCK HEIGHT
2032
NOMINAL DOOR HEIGHT
2128
OVERALL FRAME HEIGHT
2175
MINIMUM LINTEL HEIGHT
HEAD
PROMENADE DECK LEVEL
WELD
STEEL BULKHD.
SUPPORT ANGLES
JAMB DEPTH
RUNNING CLEARANCE
13
150
JAMB DEPTH
914
NOMINAL DOOR WIDTH
90
HANDICAP EQUIPMENT LTD.
M.V. PRINCE EDWARD
HANDICAP DOOR
N/A
CONCORD ELEVATOR
WOODBRIDGE, ONTARIO
C-2477
4 of 4
DRAWN WITH "AUTOCAD"

APPENDIX B

LIFT SYSTEM INTERFACE DRAWINGS


PROFILE
BRIDGE DECK
MEZZANINE DECK
PROMENADE DECK
MAIN DECK

NOTES:

1. [illegible]
2. [illegible]
3. [illegible]

FOR GUIDANCE ONLY

[illegible]

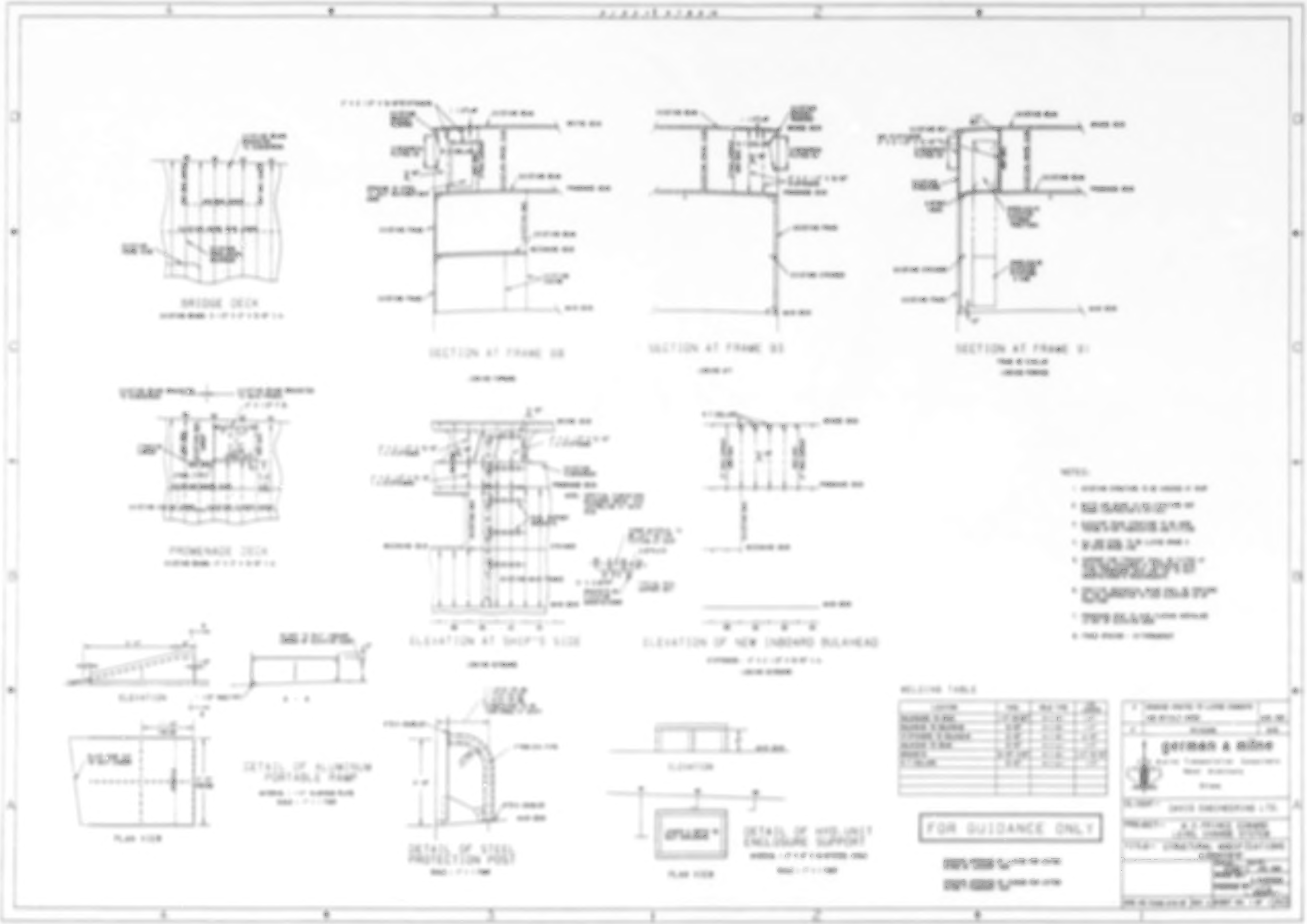
[illegible]

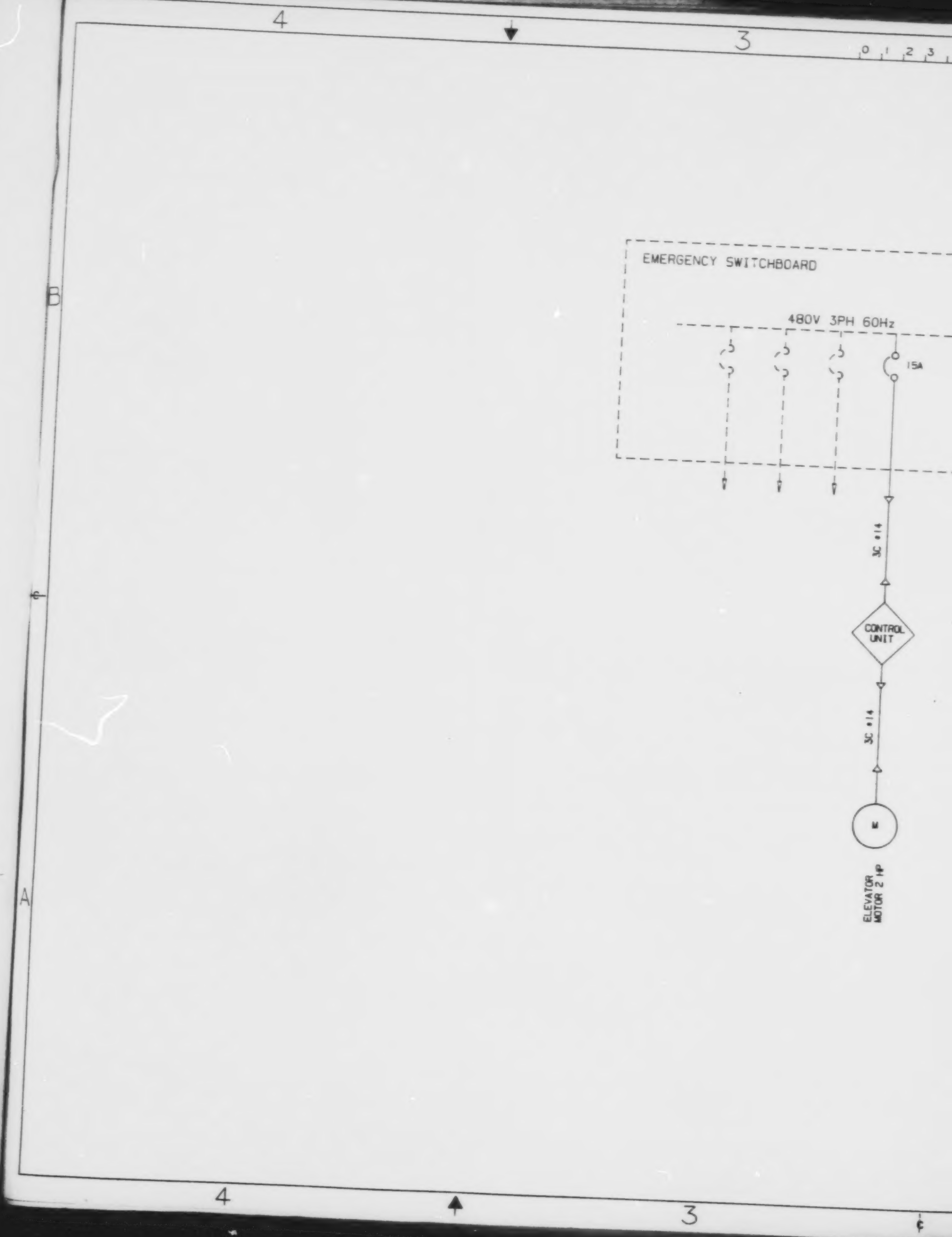
german & milne
Marine Transportation Consultants
Naval Architects
Ottawa

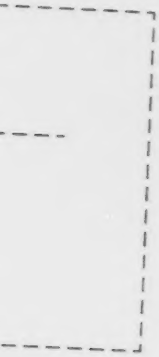
CLIENT:- DAVIS ENGINEERING LTD.

PROJECT:- M.V. PRINCE EDWARD
LEVEL CHANGE SYSTEM

TITLE:- GENERAL ARRANGEMENT
[illegible]


BRIDGE DECK
SECTION AT FRAME
SECTION AT FRAME
SECTION AT FRAME
PROMENADE DECK
ELEVATION AT SHIP'S SIDE
ELEVATION OF NEW INBOARD BULKHEAD
NOTES:
ELEVATION
A - A
PLAN VIEW
DETAIL OF ALUMINUM PORTABLE RAMP
DETAIL OF STEEL PROTECTION POST
ELEVATION
PLAN VIEW
DETAIL OF HYD. UNIT ENCLOSURE SUPPORT
WELDING TABLE
FOR GUIDANCE ONLY
german & milne
Ottawa
CLIENT: DAVIS ENGINEERING LTD.
PROJECT:
TITLE: STRUCTURAL MODIFICATIONS


4
3
0 1 2 3
B
A
EMERGENCY SWITCHBOARD
480V 3PH 60Hz
15A
3C #14
CONTROL UNIT
3C #14
M
ELEVATOR MOTOR 2 HP
4
3



APPROVED BY CCGSSB PER LETTER
DATED 22 JANUARY 1991

A	VERTICAL LIFT SECTION DELETED	
N°	REVISIONS	DATE

german & milne
Marine Transportation Consultants
Naval Architects
Ottawa

CLIENT— DAVIS ENGINEERING LTD

PROJECT— LEVEL CHANGE SYSTEM

TITLE— SINGLE LINE DIAGRAM ALTERNATIVE "B"

SCALE: N.T.S.
DATE: DECEMBER 90
DRAWN BY: W. HENDERSON
CHECKED BY:

DRG.NO. 7349A-600-01
REV. A
SHEET NO. 1 OF 1
A1

APPENDIX C

TECHNICAL SPECIFICATIONS FOR THE LEVEL CHANGE SYSTEM

TECHNICAL SPECIFICATIONS FOR THE LEVEL CHANGE SYSTEM ON THE VESSEL "M.V. PRINCE EDWARD"

Prepared For:

HANDICAP EQUIPMENT LTD.
St. John's, Newfoundland

Prepared By:

W.R. DAVIS ENGINEERING LIMITED
CONSULTING ENGINEERS
Ottawa, Ontario

and

GERMAN & MILNE
A DIVISION OF ECS GROUP OF COMPANIES

DAVIS File No.: 90136

90136-2.rpt

MARCH 1991

C.1

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DEFINITIONS

The Contractor	The Company which will undertake the work. **Handicap** Equipment Ltd., St. John's, Newfoundland.
The Naval Architect	German & Milne a Division of ECS Group of Companies
Design Engineers	W.R. Davis Engineering Ltd.
The Regulatory Authorities	Canadian Coast Guard, Ship Safety Branch
	Lloyd's Register of Shipping
Owner	Northumberland Ferries Ltd.
Owner's Representatives	Design Engineers and the Naval Architect

.0 INTENT

This specification describes the work required to install a level change system on M.V. "Prince Edward".

The intention is to provide sufficient information and guidance such that the Contractor shall, with this guidance and his own experience, execute an installation complete in all respects and conforming to the requirements of the Regulatory Bodies listed in the "Definitions".

The elevator and all associated equipment and machinery shall be supplied by the Contractor.

The Contractor shall be responsible for all work executed by his Sub-Contractors.

The descriptions included in this specification, supplemented by the associated drawings describe the principal characteristics of the proposed installation but do not necessarily cover all details. It is, therefore, necessary that the Contractor survey the appropriate area of the ship prior to submitting his tender. For this purpose the Contractor will make the necessary arrangements with the Owner to visit the ship at a suitable time.

Any proposal or significant departures from the specification, or any error or omissions realized therein, must be communicated to the Design Engineers, the Naval Architect and to the Owner for resolution prior to the submission of tenders. All work, whether specifically mentioned or not, but required to carry out the additions and alterations described in this specification, shall be provided for in the tender.

The work to be done includes:

- The supply and installation of an elevator suitable for use by a wheelchair occupant or other person with limited mobility (eg. cane user) and attendant operator.
- The electrical installation necessary for the operation, lighting and signalling of the elevator.
- Supply of spare parts that meet short voyage requirements.

2.0 APPROVALS, SUPERVISION, INSPECTION AND TESTING

2.1 APPROVALS

2.1.1 Drawings

Any drawings which the Contractor prepares or any modifications he makes to the drawings listed in Section 4.0 of the specification, shall be subject to the approval of the Owner's representative, the Naval Architect and the Design Engineers, before execution of work. Any drawings requiring approval by the Regulatory Authorities shall be submitted and approved before commencement of work.

2.1.2 Purchase Orders

All purchase orders shall be approved by the Owner's representative before material or equipment are ordered. If steel is used from the Contractor's stock it shall be identified and mill test certificates shall be presented to the Owner's representative for verification.

2.1.3 Supervision & Inspection

The work will be subject to full time or part time supervision by the Owner's representative, at the Owner's discretion. Regulatory Authorities shall be advised by the Contractor when the work commences and at any time during the execution of the work when their presence is required.

Take critical site dimensions to ensure that tolerances and clearances to other constructions have been maintained, and so that necessary adjustments are made to adapt work of this Section during its fabrication and installation.

Ensure that anchors, inserts, pockets, bearings, services, and similar provisions, installed by others, are adequate to meet specified requirements, and make adjustments before installation.

Do not proceed with work of this section until site conditions and work on which it depends are satisfactory within limitations of adjustment.

Ensure that construction and service requirements for work of this Section which is to be performed under work of other Sections are explicitly communicated to the Contractor by drawings, diagrams, engineering data sheets and special instructions before the work concerned commences. Construction requirements shall include, but not be restricted to, locations of machines, operating devices, apparatus, services and accessories; structural members, framing, loadings, hoistway, guide rail and sill supports, cutting and patching; access for installation of work; holes in decks, bulkheads and other construction and temporary protection.

Assist or supervise the location and installation of work preparatory to work of this Section as may be required by those performing the preparatory work. Provide necessary templates.

On satisfactory completion of the work, it shall be accepted by the Owner's representative.

2.1.4 Testing

2.1.4.1 Weathertightness

The elevator trunk including the door, shall be hose tested.

2.1.4.2 Load Testing and Operation

On completion of the installation and prior to acceptance by the Owner's representative and Regulatory Bodies, the following tests shall be performed. Tests 1, 2 and 3 shall be performed at least ten times:

Test 1: The elevator shall be called to and sent from each landing to the other and is to demonstrate operation that wheelchair users find acceptably smooth when compared to other elevators that are similar with smooth operation in all respects.

Test 2: The primary power source is to be interrupted during operation to demonstrate the emergency braking system, the use of emergency equipment and systems and the re-activating of the elevator. The procedure for escape from the elevator shall also be demonstrated.

Test 3: This shall repeat Test 1 at 10 percent overload and the brakes tested at 25 percent static load.

Test 4: Drop Test. The braking system shall be locked out and the elevator dropped to prove the operation of the emergency stopping and control devices.

CERTIFICATES; HANDBOOKS AND MANUALS

Certificates for materials and test certificates of the installation shall be supplied in triplicate to the Owner.

Six (6) copies of all maintenance, instruction and spare parts manuals shall be given to the Design Engineers.

The Contractor shall comply with any statutory requirements respecting display of certificates.

4.0 DRAWINGS

The following drawings prepared by the Naval Architect are provided in association with this specification for the general guidance of the Contractor:

Drawing No. 7349A-401-02 - "General Arrangement", Alternative "B"

Drawing No. 7349A-219-02 - "Structural Modifications", Alternative "B"

Drawing No. 7349A-600-01 - "Single Line Diagram", Alternative "B"

The Contractor shall prepare all other drawings necessary for the execution of the work.

5.0 WORKMANSHIP AND MATERIALS

All workmanship and materials shall conform with the best marine practice.

All new materials not specified but necessary for completion of the work shall be identical to, or at least of an equivalent and compatible standard to, materials previously removed or existent in the vessel, but in all cases shall meet the requirements of the Regulatory Authorities.

All tradesmen shall be qualified for the work they perform and shall be supervised by charge hands or foremen thoroughly knowledgeable in their respective trades.

6.0 GENERAL SERVICES

The Contractor shall provide Liability insurance for the period during which the work is executed. A minimum of $1,000,000.00 Liability Insurance is required.

7.0 EXTRA WORK

Work not specifically defined by this specification or relevant changes thereto shall not be commenced without the prior agreement of and written authorization by the Owner's representative, Design Engineers. Extra work items shall be adjudicated in accordance with the provision of the contract.

8.0 USE OF VESSEL'S FACILITIES

For the purpose of carrying out the alterations no use shall be made of the vessel's equipment unless special approval is given by the Owner.

In the case of any of the vessel's machinery, equipment or fittings being used by the Contractor for any purpose whatsoever, the Contractor shall be held responsible for the reconditioning if necessary and shall make good any damage resulting from such use.

9.0 STEELWORK

9.1 GENERAL

An elevator trunk fabricated of steel to Lloyd's Grade "A" or ASTM Grade A36 shall be provided for the contractor at the Ship's side, port, between frames 90 and 93. This shall also provide partial plating-in of the sidescreens at the promenade deck level.

The trunk shall have radiused corners inboard, shall be stiffened vertically as shown on the structural drawing and shall be of welded construction.

A door opening dimensioned and located as required by the elevator manufacturer shall be cut in the aft side of the trunk.

9.2 EXISTING STRUCTURE

Where structure must be penetrated for passage of cables, etc., compensation shall be fitted as required by the Regulatory Authorities.

9.3 WELDING

The requirements of CSA standard W59, latest revision or ASME Section 9, shall apply to this work, in particular as regards the following:

- Contractor qualification
- Operator qualification
- Procedure qualification
- Assembly and fit up; dimensional tolerances
- Environment conditions
- Welding Inspection

All butt welds shall be complete penetration welds.

10.0 REMOVAL AND RELOCATION OR REPLACEMENT OF EXISTING OUTFIT ITEMS

10.1 GENERAL

Certain items of outfit will have to be removed to provide access for the new elevator.

All such items shall be relocated; no items shall be dispensed with. These items shall be operational after relocation and the Contractor shall be responsible for the supply and installation of any additional cables, pipes, brackets, or other ancillary equipment necessary to the function of the item in its new position.

The major items to be relocated are listed; it is the Contractor's responsibility to determine if any other items shall require relocation.

10.2 INSULATION

Where existing insulation has been disturbed to permit installation of the new elevator, any deficiency shall be made good to the standard of the original insulation.

10.3 PIPING

Existing piping on the Ship's side in way of the new elevator shall be rerouted as required.

11.0 ELEVATOR

The elevator, suitable for a wheelchair occupant and operator shall have stations at two levels and be supplied by the Contractor. The Contractor shall be responsible for the supply and installation of the elevator and all its essential appurtenances, using his own labour, that of his supplier or a combination of both.

The elevator is a "Prolift" model manufactured by Concord Elevator Inc. and incorporates all the sequencing controls and usual safety features. The elevator system shall meet all CAN/CSA-B355-M86, CAN-3-B44-M85 and CAN-3-B44S1-87 regulations, Section 38 CSA C22.1 1990, as well as the Draft Barrier Free Design Standards for Ferry Services by Marine Policies and Programs, November 18, 1986.

The following describes the minimum requirements for the elevator system:

- Type IR.
- Signage & Controls.
  - Elevator entrance/exits shall be clearly marked with the International Symbol for Accessibility, and as required by B-355 and jurisdictional authorities (exact locations to be determined once the elevator is installed and operational).
  - Buttons of the elevator control panel shall be located between the heights of 840 mm (33 in) and 1.40 m (4.59 ft) measured vertically from the floor.
  - Control buttons used to initiate, emergency stop, etc. shall be identified by lettering or pictograms or both.
  - Keyed control for the elevator will be provided.
  - All lettering shall be bilingual and be displayed beside the button and raised or recessed a minimum of 1 mm (0.039 in). Numbers, symbols and pictographs shall be used where appropriate.
  - Minimum size of buttons to be 18 mm (0.7 in) and heat sensitive buttons shall not be used.
  - Access to lift shall be controlled by a key switch. All operating devices shall be of constant pressure type push buttons. Car operating devices shall override all hall operating devices.
  - A "Dead-Man" control system requiring operation by two attendants before the lift can descend (one in the cab and one at the lower level ensuring a clear descent path) shall be provided.
  - Lift shall operate only if all the hoistway door or gates are closed and mechanically locked.
  - Direction buttons shall operate the lift in the selected direction. Lift shall stop if the push button is released.

  - Car shall stop and ring alarm bell when red emergency button in car is pressed.
  - Car shall automatically level to floor when it is in the levelling zone, provided push buttons are released.
  - Up and down limit switches shall stop the motion of car in the respective direction.
  - Two position ON-OFF key switch with key removable in OFF position only. It shall be easy to operate (NO PUSH-PULL-TURN-SEQUENCE).
  - One Mushroom head BLACK push-button (constant pressure type).

- Lift Parameters
  - Minimum inside dimensions of any elevator shall not be less than 1.40 m x 0.75 m (4.59 ft x 2.46 ft).
  - Minimum rated load and capacity shall be 453 kg (1000 lbs).
  - The maximum capacity and rated load shall be displayed at the operating location.
  - The rated speed of the carriage shall not exceed 0.15 m/s (0.49 ft/s).
  - Mechanical locking device with specialized control system to assure stability of lift when not in use, or under rough sea conditions.
  - Deck to deck service to be 512.763 cm (16 ft. 9-7/8 in.)
  - Special paint finishes for sea duty to be provided, and all steel to be painted shall receive two coats of red oxide primer to a dry film thickness of 75 microns.
  - Audio-visual alert system, operation when lift controls are activated.
  - Dual limit switches.
  - Wide rail stance for stability.
  - Minimal overhead clearance at top floor (usually 96").
  - Fully enclosed cab with 7'0" high cab, open ceiling with 1/2" grid "egg crate".
  - For this installation, 1:2 cable hydraulic is suggested which uses galvanized aircraft cable and fully chromed hydraulic piston for protection in a sea environment.

  - Emergency lights and lift operation in the event of a failure in the normal power supply. (Operation in "Down" direction only). Automatic charging system and batteries (sealed, gel-cel supplied).

  - Pump unit specifically designed for sea duty, with splash baffles and raised breather/access inlets to minimize or eliminate leaking due to heavy sea environment.

  - Electric motor to be 25% over rated to life the load at specified speed.

  - Lamacoid plastic engraved operation signs to be provided.

  - Emergency cab lowering valve, manually operated.

  - The elevator shall be provided with an audio-visual alert system, operational when lift controls are activated.

- Interior Considerations.

  - Cab is MCP 1/2" melamine panels, with choice of about 10 interior colours; handrail; stainless steel #4 finish cab control plate; S.S #4 trim; steel checkerplate floor painted in rust resistant paint and rubber matting, non-skid, supplied.

  - A minimum illumination of 100 lux shall be provided at the drive unit, carriage, and landings.

  - A minimum of two lamps installed in a manner such that failure of one lamp will not cause the remaining lamps to extinguish.

  - Emergency lighting of at least 2 lux required to illuminate the carriage for 1 hour shall be provided.

  - Two oak handrails shall be provided in the elevator. Handrails shall be located 840 mm (33 in) measured vertically from the car floor and have clearance of 40 m (1.57 in) between the wall and inner edge of rail. Handrails shall be able to withstand a force of 1.25 KN (281 lbs) without flexing.

  - All projections, edges or sharp corners shall be protected or rounded to prevent injury.

- Entrance/Exit

  - The maximum distance between the elevator floor sill and the shaft shall be 15 mm (0.6 in).

  - Platform toe guard will be provided at each carriage entrance opening to extend below platform surface a minimum of 125 mm with a 50 mm x 30 degree bend at the lower edge.

- Elevator shall be equipped with an automatic self-levelling device, to maintain the carriage within 12 mm of the landing.

- Minimum clearance when elevator door is fully opened shall be 810 mm (31.9 in).

- Door size to be 915 mm x 2030 mm fire proof for 1-1/2 hr, with a vision panel.

- Door handles to meet CSA - B651-M90, use by and for the handicapped.

- Landing door interlocks G.A.L. type "M" CSA/UL approved.

- Fixed cam on car for locking and unlocking of loading entrance door.

- Light fixture at top of cab, min 1200 mm, 2 fluorescent tubes.

- Emergency cab lowering valve, manually operated.

- Emergency lowering power supply.

- Maximum door opening force to be 40N (9lbs).

- Telephone enclosure in cab.

- Power supply requirements to be 460 volts, 30 amps 3 phase, for the hydraulic pump and motor, and 110 volts, 15 amp, single phase for lighting purposes.

• Safety Considerations.

- In the event of a power failure a secondary power source or mechanical means shall be provided to move the lift.

- An emergency stop button, red in colour, marked STOP that will when activated cause the power to be removed from the drive unit shall be provided.

- An audible alarm shall be actuated by the emergency stop switch or by a separate switch marked ALARM. In the event of a failure of normal ship power, the alarm will remain operative.

- An upper and lower limits switch shall be provided at each end of the travel.

- Overspeed governors shall be incorporated to limit speed of the lift to 150% of rated speed.

- Where a vertical platform lift is suspended by wire ropes, there shall be a minimum of two ropes. The rope will have a safety factor of 7.6 based on a rated full load and have at least a minimum breaking load of not less than 7.855 KN (1765 lbs). The suspension ropes will not have a diameter of less than 6.2 mm (0.24 in) for elevator rope and 3 mm (0.12 in) for aircraft rope.

- The wire ropes shall be galvanized and the hydraulic piston will be fully chromed.

- The drive unit shall be provided with brake capable of bringing the platform with 125% rated load to a complete stop within a distance of 20 mm (0.79 in).

- A passenger should not be exposed to moving or rotating components.

- The hydraulic power pack will be mounted on the ships side close to the elevator as drawn in the General Arrangement Drawing.

- Environmental.
  - The lift shall be capable of operation in temperatures ranging from -40°C (-40°F) to +40°C (104°F).
  - All materials used will be of a type that is resistant to corrosion in a salty environment or be treated to provide adequate protection.
  - All electrical components must be moisture resistant.
  - All mechanical components must be hermetically sealed.

- General Elevator Installation Requirements.
  - Install all components of the elevator system that are specified in this Section to be provided, furnished, supplied and similarly included in the work, and that are required by jurisdictional authorities, to ensure that each system is completely functioning.
  - Install work of this Section only by specialist elevator mechanics employed by and under direct supervision of the elevator manufacturer.
  - Ensure that elevator operation is free of vibration and sideways movement of car, and that it functions smoothly and quietly in all its parts.
  - Install for elevator system the materials and equipment required for transmission of power within the system, and the control devices required for it to function as specified.
  - Machinery and Equipment: Include anchor bolts, other setting materials and layouts of anchorage of elevator machinery.

- Install guide rails plumb within 1/8", together with brackets, under work of this Section.

- Hoistway Entrances: Install entrances plumbed one over the other in hoistway.

- Electric Wiring: Install electric wiring required to connect all parts of the equipment within each system to conform to the reference standard or to meet requirements of jurisdictional authorities whichever is more stringent.

- Finishing: Retouch damaged prime paint on surfaces which were shop painted.

14.0 PAINTING, SIGNS AND NOTICES

14.1 NEW PAINTWORK - GENERAL

All bare steel resulting from the installation of the elevator shall be painted. New steel shall be abrasive blasted on all surfaces.

14.2.1 Steel Behind Insulation and Linings

All steel which shall later be covered by insulation shall receive one coat of red oxide primer to a dry film thickness of 50 microns.

14.2.2 Steel Exposed to View

Steel which is not insulated or lined shall receive two coats of red oxide primer to a dry film thickness of 75 microns and one finish coat of paint compatible with surrounding paintwork and of the same colour.

14.3 NOTICES

14.3.1 General

The use of self-adhesive, embossed plastic strip labels of the "Dymo" or similar type shall not be accepted on any part of the new installation.

14.3.2 Passenger Information Notices

All passenger information notices shall be in English and French.

At each deck level the following notice shall be prominently displayed:

"This elevator is reserved for the use of passengers who have difficulty using stairs and is operable only by a crew member".

"L'ascenseur est strictement reservé pour les personnes qui ne peuvent pas monter les escaliers. Et, seulement un membre de l'équipage est autorisé à faire opérer l'ascenseur."

14.3.3 Warning Notices

All notices required for the safety and security of personnel performing maintenance of the installation, as required by Regulatory Bodies or recommended by the elevator supplier, shall be securely mounted in the appropriate areas.

14.3.4 Painted Notices

All existing painted notices for the information of passengers which are obliterated by fitting of the elevator shall be repainted in locations approved by the Owner's representative, the Design Engineers.

PROTECTION

GUARDS

Wire mesh or sheet metal guards shall be fitted wherever necessary to prevent injury by moving parts of machinery, pulleys, ropes etc.

16.0 ELECTRICAL

16.1 NEW INSTALLATION

16.1.1 General

Hook up to an installed and available power supply of 460 Volts 3Ph, 60 Hertz, 30 amp (no neutral) to the new elevator, or 120V, 3Ph, 60 Hz, 15 amp.

16.1.2 Cable

All new cables shall:

a) Be marine type manufactured to the approval of the SSB and Classification requirements.

b) Conform to IEEE-45 requirements.

c) Be installed in accordance with the SSB regulations.

d) Be tagged with their circuit designation at all points and on both sides of deck or bulkheads.

16.1.3 Installation

All new cables shall;

a) Be supported on horizontal or vertical wireways.

b) Pass through deck stuffing tubes for fire and/or watertight integrity.

c) Be mechanically protected where necessary.

d) Be in accordance with SSB TP2237 Regulation where fire zone boundaries are applicable.

16.1.4 Cable Splicing

Should it be necessary to sever cables, the cable splicing methods shall be acceptable for re-joining cables, but shall be in accordance with TP127 and IEEE 45 in all respects. Wherever possible, the cables shall be re-joined in junction boxes as the preferred extension method.

Prior to the severance of cables, the contractor shall:

a) Mark each cable with an identification tag approximately one metre either end of cut.

b) Use suitable SESK splicing kits, supplied by Yale Enterprises Ltd., Quebec, Tel. No. 514-636-1026 which has SSB approval, for re-joining cables.

16.1.5 Power and Lighting Cables

Cables for 120 Volts or 460 Volts shall be 2 or 3 conductor respectively and the nominal conductor cross sectional area shall not be less than 2.1 mm^2 for any cable selected for installation.

16.1.6 Miscellaneous Fixtures

The contractor shall supply and install the following:

16.1.7 Engraving

The contractor shall provide and fit where necessary new engraved nameplates pertaining to electrical equipment.

16.1.8 Testing

Before power is applied to any system or sub-system which has been renewed, disturbed or modified, to accommodate the fittings of the elevator and the electrical and control circuits shall be checked for correct installation.

The contractor shall prepare a check test list which shall be supplied to the owner, complete with all readings taken.

Where possible, tests shall be carried out using standard test equipment.

17.0 WARRANTY

Provide a guarantee for a period of 1 year from the date of commissioning to cover the repair or replacement of defective equipment or work that is permanent part of the installation. This guarantee shall not include the repair of defects, or replacement of any component made necessary by mis-use or neglect of manufacturer's maintenance requirements. The guarantee does cover the quality and corrosion resistance of all components.

Provide maintenance on the lift system described herein for a period of 3 months after completion of work and turning over to the owner. Renewals or repairs necessitated by negligence or misuse of the equipment or by any other reason shall not be the responsibility of supplier.

18.0 SPARE PARTS

Spare parts as required by classification to be provided. These are to include:

- micro switches
- key switches
- call button
- door interlock
- valve
- fuses

19.0 W.R. DAVIS ENGINEERING LIMITED STATEMENT OF QUALITY REQUIREMENTS FOR PURCHASED PRODUCTS OR SERVICES

1.0 GENERAL

1.1 The supplier or subcontractor shall ensure that all products and all work performed under this Purchase Order will be fully inspected to verify compliance with requirements and specifications set forth, prior to submission for DAVIS inspection, and/or prior to shipment.

1.2 All certification required shall reference this Purchase Order, identify items by description and part or serial number if applicable, and be signed and dated by an officer of the suppliers quality staff.

1.3 All enquiries regarding quality program requirements are to be addressed to the Quality Manager, W.R. Davis Engineering Limited, 1260 Old Innes Road, Ottawa, Ontario, K1B 3V3.

2.0 QUALITY CONTROL MANUAL

2.1 The supplier shall submit to DAVIS a controlled copy of their Quality Manual or equivalent prepared in accordance with the applicable Quality standard, for review and acceptance. Evidence of registration by a recognized authority will be considered to fulfill this requirement.

2.2 Any proposed revisions to the supplier's Quality Manual during the life of this Purchase Order shall be submitted to DAVIS for review and approval before incorporating the revision.

3.0 INSPECTION AND TEST PLAN (ITP)

3.1 The supplier shall submit to DAVIS a controlled copy of their Inspection and Test Plan as prepared in accordance with the applicable Quality Standard. DAVIS' review and acceptance shall be a prerequisite to commencement of work on the applicable phase.

3.2 The supplier shall update the ITP during the life of this Purchase Order to reflect any revisions, and resubmit to DAVIS for review and acceptance.

3.3 Upon completion of review and acceptance of the ITP, DAVIS shall establish hold or witness points for selected characteristics of the product or service, and shall communicate these points to the supplier, with the accepted ITP.

3.4 A hold point is a location or stage in the production cycle where a suppliers' inspection or test shall be attended by DAVIS or a representative, who may waive such attendance in writing. The supplier shall in writing advise DAVIS of such inspection/test at least three working days in advance. In the event that attendance is waived, the production may proceed if the supplier accepts his inspection or test results, and the Quality records of such inspection or test are submitted to DAVIS for review.

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3.5 A witness point is a location or stage in the production cycle where a suppliers' inspection or test shall be attended by DAVIS or a representative, who may waive such attendance in writing. The supplier shall in writing advise DAVIS of such inspection/test at least three working days in advance. In the event that attendance is waived, the production may proceed if the supplier accepts his inspection or test results, and the Quality records of such inspection or test are submitted to DAVIS for review.

3.6 Any inspection or test procedures or Quality records on the ITP shall be made available to DAVIS on request.

4.0 ACCESS TO SUPPLIERS' FACILITIES

4.1 The supplier shall grant to DAVIS or its authorized representative unrestrained access to their, or their subcontractors, premises or working area for purposes of verification of Quality requirements.

4.2 The supplier shall provide DAVIS with the facilities required for the accomplishment of their work and the assistance required for verification or documentation.

4.3 Whenever practicable, DAVIS will provide at least 24 hours advance notice of such attendance.

5.0 MATERIAL IDENTIFICATION AND INSPECTION

5.1 The supplier shall maintain a system of material identification that ensures the use of specified materials and components. Items shipped to DAVIS shall be identified in such a manner as to permit verification on receipt.

5.2 Material test certificates shall be traceable to the material supplied.

5.3 Raw materials used by the supplier or his subcontractors in the fabrication or processing of products being produced under this Purchase Order shall conform to physical, chemical or other technical requirements specified. The supplier shall employ laboratory testing as necessary to confirm the identity of raw materials.

5.4 The supplier shall, if requested by DAVIS, forward test pieces and samples to such addresses as DAVIS may direct.

6.0 DOCUMENTATION

6.1 The supplier shall keep proper and complete inspection records and quality records, to be made available to DAVIS on request. Records shall include, as appropriate, the identification of the item; lot or batch; inspection performed and results obtained; design records; personnel, procedures, and documentation for special processes; and any other required by the Quality Standard specified.

6.2 Inspection records and quality records shall be retained by the supplier for a period of three years after completion of work under this Purchase Order, and shall be made available to DAVIS at any time.

7.0 NONCONFORMANCE

7.1 In the event the product or services are found defective in material or workmanship, or the documentation or verifiable data is missing, incomplete or incorrect, or otherwise not in conformance with this Purchase Order, DAVIS shall have the right to reject it or return it to the supplier at the suppliers' expense.

7.2 Prior to executing corrective action or otherwise dispositioning nonconforming items, the supplier shall submit the proposed action or dispositioning to DAVIS for acceptance.

7.3 Following correction of previously nonconforming items, the supplier shall identify and maintain corrected items separate from other items until reinspected and accepted by DAVIS.

8.0 CONTROL OF SUPPLIER PURCHASED ITEMS

8.1 The supplier is responsible for ensuring that all subcontracted products and services conform to the requirements of this Purchase Order.

8.2 The suppliers' procurement documents shall contain a complete and clear description of the products and services ordered, all applicable requirements are properly included or referenced, and adequate direction is provided for ensuring that Quality requirements are met.

8.3 DAVIS reserves the right to extend Quality activities to the premises and work areas of suppliers' subcontractors to ensure the products and services conform to the requirements of this Purchase Order. Any involvement by DAVIS shall not be used by the supplier as evidence of effective control by the supplier.

8.4 The supplier shall arrange access to any of his subcontractors facilities where work is being carried out, when requested by DAVIS.

9.0 JURISDICTIONAL AUTHORITY

9.1 Jurisdictional Authorities shall have the same rights of access to premises, documents pertaining to production and quality, and approval or rejection of noncomformances as that afforded DAVIS under this Purchase Order.

9.2 Jurisdictional Authority shall mean any organization to which DAVIS is contractually obligated.

10.0 CERTIFICATE OF Compliance

10.1 Shipments under this Purchase Order shall contain a Certificate of Compliance signed by the supplier and attached to the packing slip. The form of the Certificate shall be as exhibited in the example attached.

10.2 DAVIS reserves the right to reject any product or service lacking a Certificate of Compliance.

11.0 DELIVERABLES

11.1 The supplier shall deliver to DAVIS the Quality documentation described herein.

11.2 The supplier shall deliver to DAVIS a Quality Manual or evidence of registration by a recognized authority.

11.3 The supplier shall deliver to DAVIS an Inspection and Test Plan.

11.4 The supplier shall deliver to DAVIS copies of Quality records as requested by DAVIS at any time during the retention period for such documents.

APPENDIX D

INSTALLATION SPECIFICATIONS FOR THE LEVEL CHANGE SYSTEM

SPECIFICATION FOR THE PREPARATION OF THE VESSEL FOR THE INSTALLATION OF A LEVEL CHANGE SYSTEM ON THE VESSEL M.V. "PRINCE EDWARD"

VERSION 2.0

Prepared For:

PICTOU INDUSTRIES
Halifax, Nova Scotia

Prepared By:

W.R. DAVIS ENGINEERING LIMITED
CONSULTING ENGINEERS
Ottawa, Ontario

and

GERMAN & MILNE
A DIVISION OF ECS GROUP OF COMPANIES

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17.0 W.R. DAVIS ENGINEERING LIMITED STATEMENT OF QUALITY REQUIREMENTS FOR PURCHASED PRODUCTS OR SERVICES 33

DEFINITIONS

The Contractor	The Company which will undertake the work, Pictou Industries, Nova Scotia.
The Naval Architect	German & Milne a Division of ECS Group of Companies
Design Engineers	W.R. Davis Engineering Ltd.
The Regulatory Authorities	Canadian Coast Guard, Ship Safety Branch
	Lloyd's Register of Shipping
Owner	Northumberland Ferries Inc.
Owners Representatives	The Design Engineers and the Naval Architects

1.0 INTENT

This specification describes the work required to prepare the vessel for installation of a level change system on the M.V. "Prince Edward".

The intention is to provide sufficient information and guidance such that the Contractor shall, with this guidance and his own experience, execute the vessel modifications complete in all respects and conforming to the requirements of the Regulatory Bodies listed in the "Definitions".

The elevator and all associated equipment and machinery shall be supplied by the Owner and the Design Engineers and their representatives.

The Contractor shall be responsible for all work executed by his Sub-Contractors.

The descriptions included in this specification, supplemented by the associated drawings describe the principal characteristics of the proposed installation but do not necessarily cover all details. It is, therefore, necessary that the Contractor survey the appropriate area of the ship prior to submitting his tender. For this purpose the Contractor will make the necessary arrangements with the Owner to visit the ship at a suitable time.

Any proposal or significant departures from the specification, or any error or omissions realized therein, must be communicated to the Owner for resolution prior to the submission of tenders. All work, whether specifically mentioned or not, but required to carry out the additions and alterations described in this specification, shall be provided for in the tender.

The work to be done includes:

- The supply and installation of three steel posts to protect the lift rails and hydraulic cylinder.
- The fabrication, supply and installation of a lockable machine enclosure and support for the elevator motor, pump and controller.
- The preparation and supply of the required electrical power supply.
- The electrical installation necessary for the support for operation, lighting and signalling of the elevator.
- All painting of new and disturbed work, and sign placement.
- The necessary access for maintenance of the elevator and its equipment.
- Temporary support, if necessary, of ship's structure during alterations to accommodate any new items to be installed.
- Adequate support for guide rails fastenings, etc.
- Adaption of deck at the promenade level to eliminate the camber and the elevation difference at the outside of the trunk and door frame.
- Fabrication and supply of a portable ramp and storage brackets.

2.0 SUPERVISION AND INSPECTION

2.1 SUPERVISION & INSPECTION

The work will be subject to full time or part time supervision by the Owner's representative, at the Owner's discretion. Regulatory Authorities shall be advised by the Contractor when the work commences and at any time during the execution of the work when their presence is required. The electrical installations shall be inspected by the Regulatory Authorities and the Owner's representative.

On satisfactory completion of the work, it shall be accepted by the Owner's representative.

3.0 CERTIFICATES: HANDBOOKS AND MANUALS

Certificates for materials for the installation shall be supplied in triplicate to the Owner.

The Contractor shall comply with any statutory requirements respecting display of certificates.

4.0 DRAWINGS

The following drawings prepared by the Naval Architect are provided in association with this specification for the general guidance of the Contractor:

Drawing No. 7349A-401-02 - "General Arrangement", Alternative "B"

Drawing No. 7349A-219-02 - "Structural Modifications", Alternative "B"

Drawing No. 7349A-600-01 - "Single Line Diagram", Alternative "B"

The Contractor shall prepare all other drawings necessary for the execution of the work, as and when necessary.

5.0 WORKMANSHIP AND MATERIALS

All workmanship and materials shall conform with the best marine practice.

All new materials not specified but necessary for completion of the work shall be identical to, or at least of an equivalent and compatible standard to, materials previously removed or existent in the vessel, but in all cases shall meet the requirements of the Regulatory Authorities.

All tradesmen shall be qualified for the work they perform and shall be supervised by charge hands or foremen thoroughly knowledgeable in their respective trades.

6.0 GENERAL SERVICES

The Contractor shall dispose of all scrap material. Scrap steel shall not be credited to the Owner.

The Contractor shall be responsible for wharfage and all services as necessary and required.

Such services shall include but not be limited to shore power, line handling, cleaning and gas freeing, staging, shoring, removal of debris, temporary lighting, and heating, crane services, storage, security, fire protection etc.

"Security" shall be understood to include the Contractor's obligation to limit the access of his personnel to those areas necessary for proper execution of the work.

The Contractor shall provide Ship Repair Liability insurance for the period during which the work is executed. A minimum of $1,000,000.00 Ship Repair Liability insurance is required.

7.0 EXTRA WORK

Work not specifically defined by this specification or relevant changes thereto shall not be commenced without the prior agreement of and written authorization by the Owner's representative. Extra work items shall be adjudicated in accordance with the provision of the contract.

8.0 DELIVERY AND REDELIVERY OF VESSEL

Delivery and redelivery of the vessel shall be at the Contractor's plant.

The vessel shall be redelivered to the Owner in a clean and acceptable condition and all debris accumulated during the work shall be removed. All areas which may be affected are to be thoroughly cleaned.

9.0 USE OF VESSEL'S FACILITIES

For the purpose of carrying out the alterations no use shall be made of the vessel's equipment unless special approval is given by the Owner.

In the case of any of the vessel's machinery, equipment or fittings being used by the Contractor for any purpose whatsoever, the Contractor shall be held responsible for the reconditioning if necessary and shall made good any damage resulting from such use.

10.0 SAFEKEEPING

All structure, fittings, fixtures or any other materials and equipment removed to provide access and suitable to be refitted, shall be held by the Contractor in a safe and secure storage area under cover and fully protected against weather, theft or any other contingency.

All items removed from the vessel shall be identified, marked and coded for refitting in the original position or in a new location as identified in this specification or on the Guidance drawings.

All items removed from the vessel and not refitted shall remain the property of the Owner and shall be held in safekeeping pending receipt from the Owner of instructions for delivery elsewhere.

Any items which become unaccounted for subsequent to removal from the vessel shall be replaced at the Contractor's expense to the satisfaction of the Owner

11.0 GENERAL REQUIREMENTS

11.1 PORTABLE RAMP

A portable ramp to allow wheelchair access to the lift at the main deck shall be manufactured from aluminum and not to exceed 1:4 slope. The ramp shall be manufactured as per the drawing provided by German and Milne. A storage bracket and a storage location on the side of the ship, close to the lift is also to be provided.

11.2 STEEL POSTS

Steel posts as shown on the drawing as supplied by German and Milne will be supplied and installed to protect the lift rails and hydraulic cylinder and the machine enclosure.

11.3 MACHINE ENCLOSURE FOR THE LIFT PUMP, MOTOR AND CONTROLLER

The support frame for the elevator pump, motor, hydraulic oil tank and controller will be manufactured as drawn by German and Milne and installed on the side of the ship.

A machine enclosure (plywood, aluminum or steel) for the elevator pump, motor, hydraulic oil tank and controller shall be prepared at the main deck level, and installed on the side of the ship. The frame is to have resilient fasteners attached, to be supplied by Handicap Equipment. Exact location to be selected on the site. The enclosure will be built with consideration to be given to facilitate servicing of the pump, motor and controller.

11.4 PROMENADE DECK CONTOURING

The Promenade deck at the lift trunk and door frame area will be adopted and contoured to eliminate the camber and elevation difference at the ships side of the trunk and the door frame. The maximum slope is to be less than 1:4. All sharp edges that might pose a hazard will be removed.

11.5 GENERAL

Adequate support for guide rail fastenings, hydraulic cylinder, etc., shall be supplied. The guide rail brackets shall be prepared and welded as per the drawings supplied, and as per the requirements of the elevator supplier/installer.

Where structure must be penetrated for passage of cables, etc., compensation shall be fitted as required by the Regulatory Authorities.

Provide electrical installation necessary for the operation, lighting and signalling of the elevator. A fluorescent tube, light fixture is to be supplied and located outside the elevator doors, in the trunk at the Promenade level, and a light fixture is to be supplied and installed at the top of the trunk.

12.0 REMOVAL AND RELOCATION OR REPLACEMENT OF EXISTING OUTFIT ITEMS

12.1 GENERAL

Certain items of outfit will have to be removed to provide access for the new elevator.

All such items shall be relocated; no items shall be dispensed with. These items shall be operational after relocation and the Contractor shall be responsible for the supply and installation of any additional cables, pipes, brackets, or other ancillary equipment necessary to the function of the item in its new position.

The major items to be relocated are listed; it is the Contractor's responsibility to determine if any other items shall require relocation.

12.2 ELECTRICAL WIREWAYS

Existing wireways on the deckhead at the Promenade Deck shall be relocated if necessary to clear the new elevator trunk, all subject to the requirements of Section 17.0 of this specification.

12.3 INSULATION

Where existing insulation has been disturbed to permit installation of the new elevator, any deficiency shall be made good to the standard of the original insulation.

12.4 FURNITURE

Fixed deck seats at the forward end of the Promenade Deck Port shall be stripped out and relocated to provide a clear passage around the elevator trunk.

Relocation of these seats shall be to a position designated by the Owner's representative.

12.5 PIPING

Existing piping on the Ship's side in way of the new elevator shall be rerouted as required.

12.6 OTHER MOUNTED FITTINGS

All other fittings such as loudspeakers, lights, safety equipment, fire fighting equipment, illuminated signs, etc., which must be removed for installation of the elevator shall be relocated in positions approved by the Regulatory Authorities but in any case as close as possible to the original positions. All additional materials required to make these items functional in their new locations shall be supplied and installed by the Contractor.

13.0 ELEVATOR

The elevator, suitable for a wheelchair occupant and operator shall have stations at two levels and be Owner supplied. The Design Engineers representative(s) shall be responsible for the installation of the elevator and all its essential appurtenances, using his own labour, that of his supplier or a combination of both.

The elevator is a "Prolift" model manufactured by Concord Elevator Inc. and incorporates all the sequencing controls and usual safety features.

14.0 PAINTING, SIGNS AND NOTICES

14.1 RESTORATION OF DAMAGED PAINTWORK

The Contractor shall take all necessary measures to avoid an abrupt and unsightly conjunction of old and new paintwork particularly in visible areas.

Where existing paint must be removed or will be damaged by burning or welding for new structure, the eventual transition between new painting and old on completion of welding shall be gradual and unobtrusive.

While it is not the intention of this specification to dictate methods, the Owner would prefer that this be achieved by abrasive blasting of existing paint in the affected areas prior to burning. Where blasting cannot be done because of risk to existing equipment, burned edges shall be feathered off by grinding.

14.2 NEW PAINTWORK - GENERAL

All bare steel resulting from the installation of the elevator shall be painted. New steel shall be abrasive blasted on all surfaces.

14.2.1 Steel Behind Insulation

All steel which shall later be covered by insulation shall receive one coat of red oxide primer to a dry film thickness of 50 microns.

14.2.2 Steel Exposed to View

Steel which is not insulated shall receive two coats of red oxide primer to a dry film thickness of 75 microns and one finish coat of paint compatible with surrounding paintwork and of the same colour.

14.3 SIGNS

Attaching of signs, approximately 10 to 15, as supplied by the Design Engineers, and in locations as specified by the Design Engineers.

15.0 PROTECTION

15.1 GUARDS

Wire mesh or sheet metal guards shall be fitted whenever necessary to prevent injury by moving parts of machinery, pulleys, ropes, etc.

16.0 ELECTRICAL

16.1 NEW INSTALLATION

16.1.1 General

Provide access to a lockable power supply of 460 Volts 3Ph, 60 Hertz, (no neutral) to the new machine enclosure on the main deck, approximately 3 to 4 feet forward of the elevator control box and elevator to be mounted on the ships side. Fused disconnect switches or circuit breakers are required as follows:

	Switch on Time Delay Fuse Size	Volts	Phase	Quantity Required
Motor and Equipment	15 AMP	460 V	3	1
Car Lights	15 AMP	115 V	1	1

The 460v power supply will be preferably from the ships essential power supply system and if not feasible, it will be from the main power supply system.

16.1.2 Cable

All new cables shall:

a) Be marine type manufactured to the approval of the SSB and Classification requirements.

b) Conform to IEEE-45 requirements.

c) Be installed in accordance with the SSB regulations.

d) Be tagged with their circuit designation at all points and on both sides of deck or bulkheads.

16.1.3 Installation

All new cables shall;

a) Be supported on horizontal or vertical wireways.

b) Pass through deck stuffing tubes for fire and/or watertight integrity.

c) Be mechanically protected where necessary.

d) Be in accordance with SSB TP2237 Regulation where fire zone boundaries are applicable.

16.1.4 Cable Splicing

Should it be necessary to sever cables which otherwise may cause an obstacle to the installation of the elevator trunking, the cable splicing methods shall be acceptable for re-joining cables, but shall be in accordance with TP127 and IEEE 45 in all respects. Wherever possible, the cables shall be re-joined in junction boxes as the preferred extension method.

Prior to the severance of cables, the contractor shall:

a) Mark each cable with an identification tag approximately one metre either end of cut.

b) Use suitable SESK splicing kits, supplied by Yale Enterprises Ltd., Quebec, Tel. No. 514-636-1020 which has SSB approval, for re-joining cables.

16.1.5 Power and Lighting Cables

Cables for 120 Volts or 460 Volts shall be 2 or 3 conductor respectively and the nominal conductor cross sectional area shall not be less than 2.1 mm^2 for any cable selected for installation.

16.1.6 Engraving

The contractor shall provide and fit where necessary new engraved nameplates pertaining to electrical equipment.

16.1.7 Testing

Before power is applied to any system or sub-system which has been renewed, disturbed or modified, to accommodate the fittings of the elevator, the electrical circuits shall be checked for correct installation.

The contractor shall prepare a test check list which shall be supplied to the owner, complete with all readings taken.

Where possible, tests shall be carried out using standard test equipment.

17.0 W.R. DAVIS ENGINEERING LIMITED STATEMENT OF QUALITY REQUIREMENTS FOR PURCHASED PRODUCTS OR SERVICES

1.0 GENERAL

1.1 The supplier or subcontractor shall ensure that all products and all work performed under this Purchase Order will be fully inspected to verify compliance with requirements and specifications set forth, prior to submission for DAVIS inspection, and/or prior to shipment.

1.2 All certification required shall reference this Purchase Order, identify items by description and part or serial number if applicable, and be signed and dated by an officer of the suppliers quality staff.

1.3 All enquiries regarding quality program requirements are to be addressed to the Quality Manager, W.R. Davis Engineering Limited, 1260 Old Innes Road, Ottawa, Ontario, K1B 3V3.

2.0 QUALITY CONTROL MANUAL (N/A)

2.1 The supplier shall submit to DAVIS a controlled copy of their Quality Manual or equivalent prepared in accordance with the applicable Quality standard, for review and acceptance. Evidence of registration by a recognized authority will be considered to fulfil this requirement.

2.2 Any proposed revisions to the supplier's Quality Manual during the life of this Purchase Order shall be submitted to DAVIS for review and approval before incorporating the revision.

3.0 INSPECTION AND TEST PLAN (ITP) (N/A)

3.1 The supplier shall submit to DAVIS a controlled copy of their Inspection and Test Plan as prepared in accordance with the applicable Quality Standard. DAVIS' review and acceptance shall be a prerequisite to commencement of work on the applicable phase.

3.2 The supplier shall update the ITP during the life of this Purchase Order to reflect any revisions, and resubmit to DAVIS for review and acceptance.

3.3 Upon completion of review and acceptance of the ITP, DAVIS shall establish hold or witness points for selected characteristics of the product or service, and shall communicate these points to the supplier, with the accepted ITP.

3.4 A hold point is a location or stage in the production cycle where a suppliers' inspection or test shall be attended by DAVIS or a representative, who may waive such attendance in writing. The supplier shall in writing advise DAVIS of such inspection/test at least three working days in advance. In the event that attendance is waived, the production may proceed if the supplier accepts his inspection or test results, and the Quality records of such inspection or test are submitted to DAVIS for review.

DAVIS Form 44A (3-91)

3.5 A witness point is a location or stage in the production cycle where a suppliers' inspection or test shall be attended by DAVIS or a representative, who may waive such attendance in writing. The supplier shall in writing advise DAVIS of such inspection/test at least three working days in advance. In the event that attendance is waived, the production may proceed if the supplier accepts his inspection or test results, and the Quality records of such inspection or test are submitted to DAVIS for review.

3.6 Any inspection or test procedures or Quality records on the ITP shall be made available to DAVIS on request.

4.0 ACCESS TO SUPPLIERS' FACILITIES

4.1 The supplier shall grant to DAVIS or its authorized representative unrestrained access to their, or their subcontractors, premises or working area for purposes of verification of Quality requirements.

4.2 The supplier shall provide DAVIS with the facilities required for the accomplishment of their work and the assistance required for verification or documentation.

4.3 Whenever practicable, DAVIS will provide at least 24 hours advance notice of such attendance.

5.0 MATERIAL IDENTIFICATION AND INSPECTION

5.1 The supplier shall maintain a system of material identification that ensures the use of specified materials and components. Items shipped to DAVIS shall be identified in such a manner as to permit verification on receipt.

5.2 Material test certificates shall be traceable to the material supplied.

5.3 Raw materials used by the supplier or his subcontractors in the fabrication or processing of products being produced under this Purchase Order shall conform to physical, chemical or other technical requirements specified. The supplier shall employ laboratory testing as necessary to confirm the identity of raw materials.

5.4 The supplier shall, if requested by DAVIS, forward test pieces and samples to such addresses as DAVIS may direct.

6.0 DOCUMENTATION

6.1 The supplier shall keep proper and complete inspection records and quality records, to be made available to DAVIS on request. Records shall include, as appropriate, the identification of the item; lot or batch; inspection performed and results obtained; design records; personnel, procedures, and documentation for special processes; and any other required by the Quality Standard specified.

6.2 Inspection records and quality records shall be retained by the supplier for a period of three years after completion of work under this Purchase Order, and shall be made available to DAVIS at any time.

7.0 NONCONFORMANCE

7.1 In the event the product or services are found defective in material or workmanship, or the documentation or verifiable data is missing, incomplete or incorrect, or otherwise not in conformance with this Purchase Order, DAVIS shall have the right to reject it or return it to the supplier at the suppliers' expense.

7.2 Prior to executing corrective action or otherwise dispositioning nonconforming items, the supplier shall submit the proposed action or dispositioning to DAVIS for acceptance.

7.3 Following correction of previously nonconforming items, the supplier shall identify and maintain corrected items separate from other items until reinspected and accepted by DAVIS.

8.0 CONTROL OF SUPPLIER PURCHASED ITEMS

8.1 The supplier is responsible for ensuring that all subcontracted products and services conform to the requirements of this Purchase Order.

8.2 The suppliers' procurement documents shall contain a complete and clear description of the products and services ordered, all applicable requirements are properly included or referenced, and adequate direction is provided for ensuring that Quality requirements are met.

8.3 DAVIS reserves the right to extend Quality activities to the premises and work areas of suppliers' subcontractors to ensure the products and services conform to the requirements of this Purchase Order. Any involvement by DAVIS shall not be used by the supplier as evidence of effective control by the supplier.

8.4 The supplier shall arrange access to any of his subcontractors facilities where work is being carried out, when requested by DAVIS.

9.0 JURISDICTIONAL AUTHORITY

9.1 Jurisdictional Authorities shall have the same rights of access to premises, documents pertaining to production and quality, and approval or rejection of nonconformances as that afforded DAVIS under this Purchase Order.

9.2 Jurisdictional Authority shall mean any organization to which DAVIS is contractually obligated.

10.0 CERTIFICATE OF Compliance

10.1 Shipments under this Purchase Order shall contain a Certificate of Compliance signed by the supplier and attached to the packing slip. The form of the Certificate shall be as exhibited in the example attached.

10.2 DAVIS reserves the right to reject any product or service lacking a Certificate of Compliance.

11.0 DELIVERABLES

11.1 The supplier shall deliver to DAVIS the Quality documentation described herein.

11.2 The supplier shall deliver to DAVIS a Quality Manual or evidence of registration by a recognized authority.

11.3 The supplier shall deliver to DAVIS an Inspection and Test Plan.

11.4 The supplier shall deliver to DAVIS copies of Quality records as requested by DAVIS at any time during the retention period for such documents.

APPENDIX E1

OPERATING AND MAINTENANCE MANUAL

M.V. PRINCE EDWARD LIFT SYSTEM FOR DISABLED PASSENGERS

OPERATING AND MAINTENANCE MANUAL

Prepared For:

TRANSPORTATION DEVELOPMENT CENTRE
POLICY AND COORDINATION GROUP
TRANSPORT CANADA

and

NORTHUMBERLAND FERRIES LTD.
Pictou, Nova Scotia

Prepared By:

W.R. DAVIS ENGINEERING LIMITED
CONSULTING ENGINEERS
Ottawa, Ontario

DAVIS File No.: 90136

90136.RPT

OCTOBER 1991

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1.0 INTRODUCTION

1.1 BACKGROUND

The Level Change System (LCS) for the disabled was developed by W.R. Davis Engineering Limited (DAVIS) in response to a request from the Transportation Development Centre, Policy and Coordination Group, Transport Canada.

This system will eliminate some of the common difficulties which wheelchair users and mobility impaired travellers face while changing deck levels on ferry vessels without level change systems.

The specially designed hydraulic/cable lift system, designed by Concord Elevator, transfers the passenger and attendant from the Main (car) Deck to the Promenade Deck and back down to the Main Deck.

1.2 OBJECTIVES

The objective of this document is to provide procedures for the safe operation and maintenance of the lift. Only trained and authorized personnel should be permitted to operate the system. Operators are expected to read and understand the operating instructions and safety rules and to be trained by a qualified person. All operators should be given on-site training. A minimum of five runs without occupants is recommended before actual service.

1.3 SCOPE

This manual contains information necessary for the ferry personnel (two passenger attendants) to operate the lift. Also included is a description of the maintenance requirements for the system. Questions not covered in this manual should be addressed to the appropriate W.R. Davis Engineering or Transportation Development Centre personnel, listed in Appendix A.

2.0 LEVEL CHANGE SYSTEM DESCRIPTION

The Level Change System is a hydraulic/cable lift specifically designed by Concord Elevator to allow mobility impaired passengers to access and change deck levels. The lift is located on the aft side of the vessel, with service between the Main Deck and the Promenade Deck. It is built for continuous, reliable performance, incorporating the structural strength of the vessel with dependable, hydraulic power, heavy-gauge steel construction, and solid state electronics. The lift meets or exceeds C.S.A. B-355 safety standards.

The overall interior dimensions of the lift are: height 2032 mm, width 889 mm, depth 1473 mm. It is intended that the device will carry one wheelchair user or mobility impaired passenger and one attendant at a time.

The lift includes the following features:

- Non-slip rubber material on the floor;
- Two oak handrails inside the lift;
- Mechanical locking device with specialized control system to assure stability of lift when not in use, or under rough sea conditions;
- Special paint finishes for sea duty;
- Audio-visual alert system, which operates when lift controls are activated;
- "Dead-Man" control system requiring operation by two attendants before lift can descend, (one in cab, and one at the lower level, ensuring a clear descent path);
- Dual limit switches, to provide levelling within ±12 mm of the landing;
- Wide rail stance for stability;
- Fully enclosed cab with open ceiling with 1.27 cm grid "egg crate";
- A cable and hydraulic support and using galvanized aircraft cable and fully chromed hydraulic piston for protection in a marine environment;
- Cab finished with white melamine panels, stainless steel cab control plate and trim, and steel checkerplate floor painted with rust resistant paint;
- Emergency, battery powered lights and lift operation in the down direction, in the event of a failure of the normal power supply;
- An emergency manual lowering valve in the machine room in the event that the battery powered emergency system is not functioning;
- Automatic charging system and batteries (sealed, 24VDC, gel-cel supplied);
- Pump unit specifically designed for sea duty, with splash baffles and raised breather/access inlets to minimize or eliminate leaking due to heavy sea environment;

- Large "mushroom" head, push button controls mounted inside the cab, for the raising and lowering of the lift, at an accessible level for easy operation (these button controls are key controlled, and require constant pressure for operation);

- Printed circuit board controls in the cab for easy service.

- Interior lighting consisting of 2 fluorescent light tubes (914 mm long) mounted in a guarded frame.

The general specifications of the system are as follows:

- Model Prolift-1, Type II;

- Capacity 454 kg (1000 lbs);

- Travel 4953 mm (195.0 in);

- Rated Speed 0.14 m/s (0.46 ft/sec);

- Controller, Model HLCP2K46B360C025 Type CPFS, CSA#LR546 82-4 control voltage 24 VDC, 1 amp, 2.5 hp, 5 amp, Manufactured by Concord Elevator.

3.0 OPERATING PROCEDURES

3.1 GENERAL INSTRUCTIONS

Learn the location and function of all controls before using the lift:

Key Switch (Cab)

The key switch on the right side of the control panel turns the platform electrical power ON and OFF. It is provided to limit use of the lift to authorized persons only. When de-activated, cab and landing control buttons are inoperable. This is the switch that is to be activated for day to day use.

Parking Key Switch (Cab)

This key switch is located on the left side of the control panel, and has a red backing plate. The key that fits into this switch is the round key.

Please note that under no circumstances during normal operation of the lift should this switch be operated by inserting the key and turning the switch clockwise.

The function of this keyed switch is to unlock the lift brake system, by overriding the built in self-levelling system. This keyed switch overrides the self-levelling system and allows the operator to raise the lift. This is the means to unlock the mechanical brakes, if they have been activated and engaged. See Section 3.5 for proper operation of the Brake Parking System.

Since this keyed switch can override the built in self-levelling system, when the lift is at the top landing or Promenade Deck, the operator can bypass the design uppermost position of the lift and move the lift all the way up to the mechanical rail stops. These rail stops will then stop the lift. The lift can be then lowered now by the operation of the "Dead Man" or Landing Controls and the cab button for lowering the lift.

However, if the cab attendant applies the Brake Parking System while the lift is tight against the mechanical rail stops, and the lift is lowered, thereby engaging the mechanical brakes, the Brake Parking System will not be releasable as designed, i.e., by moving the lift up a couple of inches to release the brakes. A qualified lift service man will have to be brought in to release the brake system.

Up and Down Cab Button Controls

The button controls in side the cab are located for easy reach. They control the up and down movement of the cab. Depress the appropriate black button to move the lift to that floor. The cab will automatically stop when the button is released. These buttons are labelled 2 and 1. The black button labelled 2 moves the lift to the upper level, i.e., the Promenade Deck, and the black button labelled 1 moves the lift to the lower level, i.e., Main Deck.

Emergency Stop/Alarm Button

This red button, directly below the black button controls can be depressed (in the event of an emergency) to stop the lift and sound the alarm.

Landing Controls

The red landing control button is installed at the lower landing (Main Deck). To lower the lift, this control button must be depressed by an attendant at the lower level ensuring a clear path of descent. It is not necessary to activate this button for the lift to ascend. This control button is referred to as the "Dead Man" Control.

Handrails

Two oak handrails are mounted inside the cab.

Emergency Light

In an emergency, a light inside the lift is automatically activated in case of a 110 V power failure. The light uses a D.C. battery back-up system, with an auto-charger.

Emergency Door Release

A special key device, to be stored in the machine enclosure allows the lift door's release from the outside in case of power failure. The Promenade Deck lift door should **only be** opened with the cab positioned at that particular landing.

Emergency Lowering Device-Cab

The down control button, labelled with the number 1, remains activated in case of a power failure. The control button automatically converts to the battery back-up system, allowing attendant to lower the cab to the lower landing and exit the lift.

Upper Landing (Promenade Deck) Doors

The swing type lift door is ULC 1-1/2 hr. fire rated and contains the following features: vision panel, two speed adjustable closer, kickplate and interlock. The lift door is automatically locked and unlocked by the lift system controller. The trunk door or the exterior door is similar to the lift door, but can be locked from both sides. This door should be locked at all times.

Cab Sliding Door (Gate)

The cab has been provided with a sliding door. This sliding door must be fully closed, and latched with the mechanical latching device provided, before the lift can be operated. Extra care should be taken to ensure that the passenger is away from the cab sliding door and as well, that the attendant is always clear of the sliding cab door. The attendant must not be touching or be in contact with the gate while the lift is in motion.

Manual Lowering Device - Pump Unit

During a power outage, if the emergency lowering system in the cab becomes non-operational the cab can be manually lowered using the red release knob on the pump unit (located on the Main Deck inside the machine enclosure).

Brake Parking System

The Brake Parking System is located in the cab, behind a cabinet door directly below the cab control panel. Behind the cabinet door is a control rod with a round handle. To activate the Brake Parking System the spring loaded rod is to be moved down and rotated clockwise about 90°. To unlock the Brake Parking System, the reverse procedure is used. The control rod is rotated counterclockwise and the spring loaded rod should move to its up position. This is the "off" position.

Park Brake Light

The red Park Brake Light is located just above the cab controls. When the light is on the brakes are on. When the light is off, the brakes are off.

3.2 OPERATOR INSTRUCTIONS

Operating Lift from Landing Controls

NOTE: This lift requires that two trained lift operators be present and operating the device. At no time should fewer than two lift operators be present for the operation of the system.

When using the landing controls, the cab can only be lowered if an operator is present inside the cab and is activating the cab controls.

- To allow the cab to descend to the lower level, the red "Dead Man" Push Button (at the maindeck) must be pushed in and maintained at constant pressure, until the cab stops at the lower landing. The cab can be stopped at any point simply by releasing the "Dead Man" button.
- The cab operator must be applying constant pressure to the black button labelled number 1.
- While the cab is descending, the landing operator must ensure that the way is clear and no obstructions, people, or vehicles are under the cab.

CAUTION: Wheelchair wheels must be locked at all times during platform movement. The passenger must be clear and away from the cab sliding gate. The attendant must be clear of the cab sliding gate.

Operating the Lift from Cab Controls

- Insert the square key into the switch located on the right side of the control panel, (not the parking key switch with the red backing plate), and turn it to the ON position (90° clockwise).

- Depress appropriate button - either #2 (upper deck) or #1 (lower deck) - to send the platform to the desired landing. Maintain constant pressure until the lift automatically stops at the desired landing.

- Down motion is only possible if the Main Deck control (i.e., "Dead-Man Button") is activated by the Main Deck operator.

- Once the lift has reached the desired landing level, release the black button (1 or 2) and turn key to the OFF position (counterclockwise). Remove the key.

- At no time during normal operation of the lift should the round parking key be inserted into the key switch with the red backing plate on the side of the control panel. The only time this key is allowed to be inserted is to release a brake set condition. (See section 3.5). Always ensure that the parking brake is off before commencing normal operation. The brake is on when the red warning light is illuminated.

Emergency Lowering Device on Cab with Battery Back-Up (Option)

This feature allows lowering of the cab from the cab itself. The system operates on batteries and is automatically activated in case of a power failure. Operate cab as follows:

- Depress down level button, black button labelled #1, and maintain constant pressure on the button until the platform is level with the bottom landing. Upon arrival, release button, remove key from the key switch and exit the cab.

- The Main Deck attendant must be present and must be operating the deck "Dead Man" controls, to allow cab descent.

NOTE: Instructions herein are also provided by detailed signs mounted at the pump unit and in the cab.

Manual Lowering Device (Pump Unit)

In case of power failure, and if the emergency lowering device in the cab is non-operational, the cab can be moved to the lower level manually using the following procedures:

- Obtain key to unlock the access door to the pump/motor/controller enclosure.

- Instruct person(s) in lift to remain calm and stay well back in the lift. Tell them your intentions.

- Switch the main switch for the main power supply to the pump to the OFF position.

- Locate manual release knob on pump unit and turn knob counterclockwise to lower the cab. Maintain constant pressure on knob until lift reaches lowest landing and stops automatically. (This is readily indicated, as there will be no further noise as the oil flows to the reservoir.)

- Remove cab key, make sure hoistway door is closed, turn on the main power switch for the pump and lock enclosure access door. Return enclosure access key and special door release key to their original storage area.

3.3 ATTENDANT PROCEDURE FOR TRANSFER OF PASSENGERS

The following features **must be** verified before normal operation and transfer of passengers can commence.

WARNING: To avoid injury, never stand, or allow anyone to stand, directly under cab or inside hoistway during operation or testing.

Cab Key Switch. Verify that when the key is in the OFF position, the buttons on the cab station are inoperable.

Cab Park Key Switch. Verify that the key is not present for normal operation.

Make sure that the parking brake control rod is in the up or off position, and the red light on the cab control panel is off.

Emergency Stop/Alarm. Depress the emergency stop/alarm button to verify that the power is removed from the drive system, the cab stops and the alarm is activated.

Door Interlock. Verify the following:

> **Door Switch**. Verify that when the lift door at the Promenade Deck is left open, the cab **will not** run in **either direction from either station**. Check controls at both stations.
>
> **Latch**. Verify that door remains latched after 2" to 4" movement away from landing. If not, adjustment is required by a qualified lift serviceman.
>
> **Cab Gate**. Verify that all controls are inoperable if gate is left in the open position.

- Position and adjust the lift ramp with the lift, when the lift is at its lowest position. Both attendants are required for this operation.

- At the Main Deck (Car Deck) one attendant must always assist the wheelchair users to park his vehicle, manoeuvre his wheelchair to the lift, and assist in moving up the ramp and into the lift.

- Once, inside the lift, the second attendant must close the sliding door, and secure the metal latch as provided to the sliding door, to prevent any possible door opening.

- The attendant must ensure that **the parking brake is off** and that the cab park key is not present in the switch as described earlier.

- Once the sliding door is secured, the attendant turns on the key switch (Cab) and depresses the number two (2) black button. This will raise the lift to the Promenade Deck.

- Once the lift has self-levelled at the Promenade Deck level, the key switch is switched to the off position, the key removed and the attendant opens the sliding door, and the lift door. The attendant must assist the wheelchair user in backing out of the lift. Once out of the lift the attendant must unlock and open the lift trunk door, being careful that no passengers are in the way of the door swing arc. Once through the trunk door, the attendant is to indicate to the passenger where the handicapped door access to the lounge is located. (At the rear of the deck). If the passenger requires further assistance it is to be provided. If further assistance is not required the attendant can return to the Main Deck (car deck) with the assistance of the "Dead Man" operating the Main Deck, second attendant controls, to allow safe lift descent.

- Before descending with an attendant and passenger, or with only the attendant, the following must be performed:

  - Lock lift trunk door;
  - Close lift door;
  - Close and latch lift sliding gate, ensure that the passenger is clear of the sliding gate. Also ensure that you are not in contact with the sliding gate at any time while the lift is moving;
  - Ensure that the Parking Key is not inserted in the Parking Switch;
  - Make sure that the parking brake is off. (ie. in the Up position) and that the red park light on the control panel is out;
  - Turn on the Key Switch (Cab);
  - Push in and hold the black #1 push button to descend;
  - Note: The "Dead Man" button must also be depressed by the Main Deck attendant before the lift will descend;
  - At the Main Deck the attendant is to open the sliding door only after the lift has come to a complete stop, and only after the ramp has been positioned as required. The attendant must assist the passenger down the ramp and to the passengers vehicle.

3.4 STORAGE

The lift should be stored in the up position at the Promenade Deck, while the ferry is in regular service. The park brake should always be applied before the lift is stored and locked up. The trunk door should always be locked. However, when the ferry is shut down overnight or for extended periods the lift should be stored in the position, to minimize the corrosion of the hydraulic piston.

At the option of the ship's captain, if the sea or wind conditions are rough, the lift may be parked in the lowest position.

3.5 OPERATING INSTRUCTIONS FOR OPERATING THE BRAKE PARKING SYSTEM

- To lock and park the lift at the upper landing (Promenade Deck) proceed as follows:
  - Ensure that the cab has been brought up to the upper landing (Promenade Deck) with the #2 black button and that the round key (Parking Key) on the left side of the panel is not inserted;
  - Open the cabinet door below the cab station;
  - Move the control rod down approximately 2 inches and turn the control rod, clockwise about 90 degrees, until a positive lock of the control rod is felt and verified. The red indicator light should turn on, indicating that the lift is "locked" at the upper landing;
  - Remove the square key from the cab key switch.
- To unlock the lift:
  - Open the cabinet door below the cab station;
  - Turn the control rod counter clockwise about 90 degrees, thus unlatching the control rod and allowing it to move up;
  - The red indicator light should extinguish, indicating the lift brakes are off and the lift is ready for use;
  - If the red indicator light does not extinguish, proceed as follows:
    - Insert round park key into the keyswitch on left side of the cab station plate with a red backing plate behind the switch, and turn the key clockwise for 1/2 second to 1 second;
    - This will allow the lift to move up approximately 3.8 cm (1-1/2 inches) which is adequate for disengaging the safety brakes;
    - The red indicator light will extinguish indicating the lift is ready for use;
    - The round park key must now be removed and stored in its appropriate location.

NOTE: At no time should the round park key be turned on with the lift in the up position, without the brake being fully "off". If this key is operated with the brake on, the lift will come into contact with the uppermost position mechanical lift rail stops. Once this occurs, the lift cannot be lowered and the brakes cannot be released. If this occurs, a licensed lift operator must be called to release the brake system.

4.0 MAINTENANCE PROCEDURES

Regular maintenance is essential in keeping the lift in proper operating condition. Please remember, as the owner of this equipment, you are responsible for making sure maintenance and upkeep is performed regularly. It is highly recommended that the lift rails be lubricated with light weight oil on an as needed basis.

Because of the complexity of this equipment, only an Authorized Concord Distributor should perform all required maintenance, service and repair work.

To assure proper operating condition of the unit, the items listed below must be inspected and/or serviced every 6 to 12 months by an authorized person. However, additional inspections may be necessary depending on amount of usage. The recommended minimal maintenance to be performed by an authorized serviceman is as follows:

- Tighten all rail and cab fastening bolts.
- Lubricate rails with light weight oil. (Do not use grease).
- Lubricate door hinges and adjust door closure if needed.
- Inspect travel cable for wear. Replace if any cuts or damage to the jacket are evident.
- Check for hose/pipe leaks. Replace/tighten fittings to correct any hydraulic leaks found.
- Check fluid level of pump reservoir and fill as necessary. (Hydra-Flo 32 hydraulic oil only).
- Tighten any hose connections or bleeder valves found loose. Check hydraulic cylinder (jack) for leaks. If necessary, packing seals may have to be replaced.

CAUTION: Under no circumstances should the pump controls or valve setting be adjusted except by an authorized Concord Service Technician. Valve settings have been preset. Unauthorized adjustment of valve settings may damage the equipment.

A sample of an available maintenance contract on the lift by the installing company, Handicap Equipment Ltd., has been included as Appendix B.

5.0 TROUBLESHOOTING

Before You Call for Service

A quick check of the Operating Instructions in this manual may prevent an unnecessary service call.

Before calling your Authorized Concord Distributor for service refer to the following checklist:

If Unit Will Not Operate

- Check for an open fuse or tripped circuit breaker at main power supply switch in pump room.
- Check that service disconnect switches are turned ON inside pump room.
- Check that emergency stop button is pulled out.
- Check that the square key on the right side of the control panel is turned to the ON position.
- Check that cab gate(s) are completely closed.
- Check motor reset button and reset if tripped. (May also be in control panel.)

If unit still will not operate, contact your local Authorized Concord Distributor for immediate service.

5.1 PARTS LIST

5.2 SUPPLIER CODE

W.R. Davis Engineering Ltd.
1260 Old Innes Road,
Ottawa, Ontario, K1B 3V3
Tel: 613-748-5500
Fax: 613-748-3972

Handicap Equipment Ltd.
P.O. Box 7391
St. John's, Newfoundland, A1E 4V8
Tel: 709-745-2182
Fax: 709-745-6461

Concord Elevator
10 Whitmore Road
Woodbridge, Ontario, L4L 7Z4
Tel: 416-856-3030
Fax: 416-851-6556

APPENDIX A

CONTACTS

PERSON	TITLE	ORGANIZATION	QUESTION RELATED TO
Mr. Adri Coppens	Manager Mechanical Engineering	W.R. Davis Engineering Ltd. 613-748-5500	General Contract Administration, Design, Evaluation
Mr. Paul Belloni	Project Engineer	W.R. Davis Engineering Ltd. 613-748-5500	Project Coordination, Design, Manufacturing, Evaluation
Mr. Gord Paterson	Marine Architect-Design Coordinator	ECS Group of Companies German & Milne Division 613-230-6201	Detailed Design, Manufacturing
Ms. Barbara A. Smith	Program Officer - Special Needs	Transportation Development Centre 514-283-0020	Project Implementation
Mr. Xavier Schnelli	Program Officer	Transport Canada (ACFA) Marine Transportation Programs 613-998-1855	Marine Policy and Programs
Mr. Paul McInerney	Project Manager	Behaviourial Team 416-656-6676	Ergonomic Evaluation
Mr. David Balmer	Vice President	Concord Elevator 416-856-3030	Lift System Design, Manufacture
Mr. Hugh McGarvie	President	Handicap Equipment 709-745-2182	Lift System Supply and Installation
Mr. Vic Rakowsky	Technical Manager	Pictou Industries 902-485-8001	Vessel Modifications
Capt. Dan Panting	Captain M.V. Prince Edward	Northumberland Ferries Ltd. 902-485-6412	Vessel Operators

APPENDIX B

SAMPLE LCS MAINTENANCE CONTRACT

Handicap Equipment Ltd.
P.O. Box 7391
St. John's, Nfld. A1E 4V8
Tel: (709) 745-2182 Fax: (709) 745-6461

Elevator Maintenance

To/
Davis Engineering Limited
1260 Old Innes Road
Ottowa, Ontario K1B 3V3

Dated at St. John's, Nfld.
February 25th. 1991

We propose to furnish maintenance on the following hydraulic elevator/s located at .Pictou .Industries. Pictou, Nova Scotia, when the vessel is in for annual refit.

Under this contract we will maintain the lift/lifts listed above, as follows. We will perform the work with persons trained, supervised and employed by us.

SCOPE OF SERVICE: We will clean, adjust and lubricate according to established procedures outlined in our maintenance manuals.

PARTS AND SUPPLIES: Included are lubricating oils, cleaning materials & grease. Parts requiring replacement are extra, the defective part to be shown to the owner. + Labour to install.

SCHEDULE: The work under this agreement to be performed
Monthly................
Semi-Annually...........
Annually... XXXXXXXX ...

CONTRACT PRICE: One.thousand.two.hundred.&.fifty......... Dollars ($ 1,250)

~~Monthly - Semi-Annually~~ - Annually

This service shall commence on .... day of ....April...... 19 92 and continue thereafter until terminated. The contract can be terminated by either party providing 90 days notice to the other.

This proposal, when accepted by you below and approved by us, shall constitute the contract between us.

Submitted for Handicap Equipment Ltd.

by ..Hugh.McGarvie.............

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APPENDIX E2

GUIDE D'EXPLOITATION ET D'ENTRETIEN

M.V. PRINCE EDWARD
PLATE-FORME ÉLÉVATRICE POUR PASSAGERS HANDICAPÉS

GUIDE D'EXPLOITATION ET D'ENTRETIEN

Préparé pour :

CENTRE DE DÉVELOPPEMENT DES TRANSPORTS
GROUPE DE LA POLITIQUE ET DE LA COORDINATION
TRANSPORTS CANADA

et

NORTHUMBERLAND FERRIES LTD.
Pictou (Nouvelle-Écosse)

Par :
W.R. DAVIS ENGINEERING LIMITED
INGÉNIEURS-CONSEILS
Ottawa (Ontario)

Dossier DAVIS n° 90136

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1.0 INTRODUCTION

1.1 Données générales

Le système de transport vertical (STV) pour personnes handicapées a été mis au point par W.R. Davis Engineering Limited (DAVIS) à la suite d'une demande faite par le Centre de développement des transports, Groupe de la politique et de la coordination, Transports Canada.

Le système a été conçu pour faciliter le transport vertical des passagers en fauteuil roulant ou à mobilité réduite sur les traversiers non équipés de plate-forme élévatrice.

La plate-forme élévatrice à commande hydraulique et à traction par câble conçue spécialement par Concord Elevator pour les traversiers permet de transporter les passagers du pont principal (véhicules) au pont promenade.

1.2 Objet

Le présent document décrit la marche à suivre pour l'exploitation et l'entretien en toute sécurité de la plate-forme. Seuls des opérateurs qualifiés sont autorisés à faire fonctionner le système. Ils doivent lire et bien comprendre le guide d'exploitation et les règles de sécurité applicables, et recevoir d'une personne compétente une formation pratique à bord d'un traversier. On recommande que les opérateurs fassent monter et descendre la plate-forme, sans passagers, à cinq reprises au moins avant d'entrer en fonction.

1.3 Portée

Ce guide renferme toute l'information nécessaire aux préposés à la plate-forme élévatrice (deux par traversier) pour son exploitation. On y décrit également les mesures d'entretien à appliquer. Pour toute autre question, prière de s'adresser aux personnes-ressources de W.R. Davis Engineering ou du Centre de développement des transports, dont la liste figure à l'annexe A.

2.0 DESCRIPTION DU SYSTÈME DE TRANSPORT VERTICAL

Le système de transport vertical est une plate-forme élévatrice à traction par câble et à commande hydraulique conçue spécialement par Concord Elevator pour permettre aux personnes à mobilité réduite de se déplacer d'un pont à l'autre sur les traversiers. La plate-forme, aménagée à l'arrière du traversier, fait la navette entre le pont principal et le pont promenade. Ce système à commande hydraulique, intégré à la structure du bâtiment, fait d'acier très robuste et doté de circuits intégrés à semi-conducteurs, est conçu pour offrir un service continu de haute fiabilité. Il respecte et dépasse même les normes de sécurité CSA B-355.

Ses dimensions intérieures hors tout sont les suivantes : 2 032 mm de hauteur, 889 mm de largeur et 1 473 mm de profondeur. Il peut transporter un passager en fauteuil roulant ou à mobilité réduite et un préposé à la fois.

La plate-forme élévatrice possède les caractéristiques suivantes :

- revêtement de sol en caoutchouc antidérapant;
- cabine dotée de deux mains courantes en chêne;
- dispositif de verrouillage mécanique muni d'un système de commande spécial permettant de stabiliser la plate-forme lorsqu'elle n'est pas utilisée ou que la mer est agitée;
- peinture spéciale pour service en mer;
- système d'alarme audiovisuel qui se met en marche lorsqu'on actionne les commandes de la plate-forme;
- dispositif de veille automatique nécessitant l'intervention de deux préposés (un dans la cabine et un sur le palier inférieur, pour permettre la descente en toute sécurité de la plate-forme);
- interrupteurs de fin de course assurant l'isonivelage de la plate-forme à ± 12 mm du palier;
- rails à écartement large pour plus de stabilité;
- cabine fermée, avec plafond ouvert et grille alvéolée (1,27 cm);

- système de traction par câble à commande hydraulique comprenant un câble d'aéronef galvanisé et un piston hydraulique entièrement chromé pour service en mer;
- cabine recouverte de panneaux de mélamine blancs avec plaque de commande et garnitures en acier inoxydable et plancher de tôle striée enduit de peinture antirouille;
- systèmes d'éclairage et de déplacement en descente de secours alimentés par batterie, en cas de panne de l'alimentation principale;
- dispositif de descente manuelle d'urgence dans la salle des machines, en cas de panne du système de secours alimenté par batterie;
- système de chargement automatique et batteries à électrolyte gélifié de 24 volts, c.c., sans entretien;
- pompe conçue spécialement pour le milieu marin, munie de chicanes de protection et d'orifices d'admission et de reniflards profilés pour réduire au minimum les fuites par gros temps;
- gros boutons-poussoirs à tête ronde commandés au moyen d'une clé pour la montée et la descente de la plate-forme, installés à portée de la main dans la cabine (on doit exercer une pression constante sur ces boutons);
- commandes à circuits imprimés dans la cabine facilitant l'utilisation de la plate-forme;
- éclairage intérieur constitué de deux tubes fluorescents de 914 mm de longueur montés dans un cadre protecteur.

Fiche technique du système:

- modèle Prolift-1, type II;
- charge admissible : 454 kg (1 000 lb);
- course : 4 953 mm (195 po);

- vitesse nominale : 0,14 m/s (0,46 pi/s);

- contrôleur, modèle HLCP2K46B360C025, type CPFS, CSA n° LR546 82-4, tension de commande 24 volts, c.c., 1 ampère, 2,5 hp, 5 ampères, fabriqué par Concord Elevator.

3.0 MODE DE FONCTIONNEMENT

3.1 Directives générales

Identifier l'emplacement et apprendre le fonctionnement de toutes les commandes avant d'utiliser la plate-forme.

Interrupteur à clé (cabine)

L'interrupteur à clé, qui se trouve à droite sur le tableau de commande, permet de mettre la plate-forme en position de marche ou d'arrêt. Ainsi, seul le personnel autorisé peut la faire fonctionner. Lorsque l'interrupteur est désactivé, les boutons de commande de la cabine et des paliers sont hors d'usage. Le préposé doit chaque jour activer l'interrupteur pour mettre la plate-forme en service.

Interrupteur du dispositif de stationnement (cabine)

Cet interrupteur se trouve sur une plaque rouge, à gauche sur le tableau de commande. Il est activé au moyen de la clé ronde.

Prendre note qu'il ne faut jamais, pendant l'utilisation de la plate-forme, insérer la clé dans l'interrupteur et la tourner dans le sens horaire.

Cet interrupteur à clé permet de déverrouiller le dispositif de stationnement en neutralisant le système d'autonivelage. Une fois ce système neutralisé, l'opérateur peut ramener la plate-forme au palier supérieur. C'est par ce moyen que l'on déverrouille les freins mécaniques s'ils ont été activés et engagés. Pour plus de détails sur le fonctionnement du dispositif de stationnement, voir la section 3.5.

Comme cet interrupteur à clé peut neutraliser le système d'autonivelage, lorsque la plate-forme se trouve au palier supérieur (pont promenade), l'opérateur peut dépasser ce palier et faire monter la plate-forme de manière qu'elle aille s'appuyer contre les butées des rails mécaniques. Pour faire descendre la plate-forme, il suffit d'actionner le bouton de veille automatique ou le bouton de palier puis le bouton de descente de la cabine.

Toutefois, si le préposé actionne le dispositif de stationnement lorsque la plate-forme repose contre les butées des rails et qu'il fait descendre la plate-forme, engageant ainsi les freins mécaniques, il ne pourra pas dégager le dispositif de stationnement comme la conception du système le prévoit, c'est-à-dire en faisant monter la plate-forme d'un ou deux pouces. Il devra faire appel à un technicien qualifié pour dégager le dispositif de stationnement.

Boutons de montée et de descente (cabine)

Ces boutons sont placés à portée de la main dans la cabine. Ils permettent de commander les déplacements en montée et en descente de la cabine. Appuyer sur le bouton noir approprié pour amorcer la montée ou la descente de la cabine. La cabine s'arrête automatiquement lorsqu'on relâche le bouton. Ces boutons portent les numéros 2 et 1. Le bouton n° 2 commande la montée de la cabine au pont supérieur (pont promenade), et le bouton n° 1, sa descente au niveau inférieur (pont principal).

Bouton d'alarme et d'arrêt d'urgence

Ce bouton rouge se trouve sous les boutons noirs. Lorsque l'on appuie sur ce bouton, dans les cas d'urgence, la plate-forme s'immobilise et l'alarme se déclenche.

Bouton de palier

Ce bouton, de couleur rouge, se trouve au palier inférieur (pont principal). Un préposé doit appuyer sur ce bouton pour actionner la plate-forme, afin d'assurer sa descente en toute sécurité. Il n'est pas nécessaire d'actionner ce bouton pour faire monter la plate-forme. On désigne aussi ce bouton sous le nom de bouton de veille automatique.

Mains courantes

Deux mains courantes en chêne sont montées à l'intérieur de la cabine.

Éclairage d'urgence

Une lumière à l'intérieur de la cabine s'allume automatiquement en cas de panne de courant. Cette lumière est alimentée par une batterie de secours, c.c., munie d'un chargeur automatique.

Dispositif d'ouverture de la porte en cas d'urgence

Un dispositif à clé spécial, aménagé dans la salle des machines, permet d'ouvrir la porte de la cabine de l'extérieur, en cas de panne de courant. On ne doit ouvrir la porte au niveau du pont promenade que si la cabine est à ce palier.

Dispositif de descente d'urgence (cabine)

Le bouton de descente, qui porte le n° 1, demeure activé lors d'une panne de courant. Il est automatiquement alimenté par la batterie de secours, permettant ainsi au préposé de descendre la cabine au palier inférieur et d'en sortir.

Portes du palier supérieur (pont promenade)

La porte à battant de la plate-forme a une cote de résistance au feu estimée à 1 heure et demie par l'ULC et possède les caractéristiques suivantes : baie vitrée, ferme-porte réglable à deux vitesses, plaque de protection et dispositif de verrouillage. Le contrôleur de la plate-forme verrouille et déverrouille automatiquement la porte. La porte extérieure est similaire à la porte de la plate-forme, mais on peut la verrouiller des deux côtés. Cette porte doit être verrouillée en tout temps.

Porte coulissante de la cabine

La cabine est dotée d'une porte coulissante. Avant d'actionner la plate-forme, on doit s'assurer que cette porte est bien fermée et la verrouiller au moyen du dispositif prévu à cet effet. Le préposé et le passager doivent en tout temps se tenir éloignés de cette porte. Le préposé ne doit jamais toucher cette porte lorsque la plate-forme est en mouvement.

Dispositif de descente manuel - Pompe

Lors d'une panne de courant, si le dispositif de descente d'urgence ne fonctionne pas, on peut faire descendre la cabine manuellement en appuyant sur le bouton de dégagement rouge qui se trouve sur la pompe (sur le pont principal, dans la salle des machines).

Dispositif de stationnement

Le dispositif de stationnement se trouve dans la cabine, derrière la porte de l'armoire aménagée sous le tableau de commande. Derrière cette porte se trouve une tige de commande munie d'une poignée ronde. Pour actionner le dispositif de stationnement, pousser la tige à ressort vers le bas et la tourner d'environ 90 degrés dans le sens horaire. Pour le dégager, tourner la tige dans le sens antihoraire de manière qu'elle retourne en position verticale. C'est la position d'arrêt.

Voyant de stationnement

Le voyant rouge de stationnement se trouve au-dessus des boutons de commande de la cabine. Lorsqu'il est allumé, les freins sont engagés, et lorsqu'il est éteint, ils sont dégagés.

3.2 DIRECTIVES À L'INTENTION DES PRÉPOSÉS

Commande de la plate-forme au moyen du bouton de palier

NOTA: *Au moins deux opérateurs qualifiés doivent être présents en tout temps lorsque la plate-forme est en service.*

Lorsqu'on utilise le bouton de palier, la cabine ne peut se déplacer vers le bas que si un opérateur est présent à l'intérieur de la cabine et qu'il actionne le bouton approprié.

- Pour faire descendre la cabine au palier inférieur, appuyer sur le bouton de veille automatique rouge (pont principal) en exerçant une pression constante, jusqu'à ce que la cabine s'arrête. Chaque fois que l'on relâche le bouton de palier, la cabine s'arrête.
- L'opérateur de la cabine doit exercer une pression constante sur le bouton noir portant le numéro 1.

- Pendant la descente de la cabine, l'opérateur qui se trouve sur le palier doit s'assurer que la voie est libre (aucune obstruction, personnes ou véhicules).

MISE EN GARDE: *Toujours verrouiller les roues des fauteuils roulants pendant le déplacement de la plate-forme. Le passager et le préposé doivent en tout temps se tenir éloignés de la porte coulissante.*

Commande de la plate-forme au moyen des boutons de la cabine

- Insérer la clé carrée dans l'interrupteur qui se trouve à droite sur le tableau de commande (et non dans l'interrupteur du dispositif de stationnement - plaque rouge) et la placer en position de marche (en la tournant à 90 degrés dans le sens horaire).

- Appuyer sur le bouton approprié, soit le n° 2 (pont supérieur) ou le n° 1 (pont inférieur), pour envoyer la plate-forme au palier désiré. Exercer une pression constante sur le bouton jusqu'à ce que la plate-forme s'arrête automatiquement.

- Le déplacement de la plate-forme vers le bas n'est possible que si le bouton de palier (ou bouton de veille automatique) du pont principal est actionné par le préposé de palier.

- Lorsque la plate-forme a atteint le palier désiré, relâcher le bouton noir (1 ou 2) puis tourner la clé en position d'arrêt (dans le sens antihoraire) et la retirer.

- Lorsque la plate-forme est en service, on ne doit jamais insérer la clé ronde dans l'interrupteur qui se trouve sur la plaque rouge, à gauche sur le tableau de commande. Cette clé doit être insérée seulement pour dégager le dispositif de stationnement (voir section 3.5). Toujours s'assurer que ce dispositif est dégagé avant de faire fonctionner la plate-forme. Les freins sont engagés lorsque le voyant rouge est allumé.

Dispositif de descente d'urgence alimenté par batterie (offert en option)

Ce dispositif permet d'amorcer la descente de la plate-forme à partir de la cabine. Il est alimenté par batterie et actionné automatiquement en cas de panne de courant. Procéder comme suit :

- Appuyer sur le bouton de descente, c'est-à-dire le bouton noir n° 1, en exerçant une pression constante, jusqu'à ce que la plate-forme soit au niveau du palier inférieur. Relâcher le bouton, enlever la clé de l'interrupteur et descendre de la cabine.

- Le préposé sur le pont principal doit appuyer sur le bouton de veille automatique pour faire descendre la cabine.

NOTA: *Les présentes directives sont également fournies sur des panneaux installés dans la cabine et près de la pompe.*

Dispositif de descente manuelle (pompe)

En cas de panne d'électricité, et si le dispositif de descente d'urgence dans la cabine ne fonctionne pas, procéder comme suit pour faire descendre la cabine manuellement au niveau inférieur :

- obtenir la clé pour déverrouiller la porte d'accès à la salle de la pompe, du moteur et du contrôleur;

- demander à la personne dans la cabine de rester calme et de se tenir au fond, et lui expliquer ce que vous comptez faire;

- placer l'interrupteur de l'alimentation principale de la pompe en position d'arrêt;

- repérer le bouton de dégagement manuel sur la pompe et le tourner dans le sens antihoraire pour faire descendre la cabine; exercer une pression constante sur le bouton jusqu'à ce que la plate-forme atteigne le palier inférieur et s'arrête automatiquement (c'est-à-dire jusqu'à ce que tout bruit cesse);

- retirer la clé de la cabine, s'assurer que la porte du puits est fermée, remettre l'interrupteur de l'alimentation principale de la pompe en position de marche et fermer la porte d'accès de la salle; replacer la clé de la porte d'accès et la clé de dégagement de la porte à leur endroit initial.

3.3 DIRECTIVES PARTICULIÈRES CONCERNANT LE TRANSPORT DES PASSAGERS

On **doit** vérifier les dispositifs suivants avant d'utiliser la plate-forme pour le transport des passagers.

MISE EN GARDE: *Pour prévenir tout accident, s'assurer que personne ne se trouve sous la cabine ou dans le puits lorsque l'on fait fonctionner ou que l'on vérifie la plate-forme.*

Interrupteur à clé de la cabine. S'assurer que lorsque la clé est en position d'arrêt, les boutons à l'intérieur de la cabine ne fonctionnent pas.

Interrupteur à clé du dispositif de stationnement. S'assurer que cette clé ne se trouve pas dans l'interrupteur lorsque la cabine est en marche.

S'assurer que la tige de commande du dispositif de stationnement est en position verticale, c'est-à-dire en position d'arrêt, et que le voyant rouge sur le tableau de commande de la cabine est éteint.

Arrêt d'urgence/alarme. Appuyer sur le bouton d'alarme et d'urgence pour s'assurer que le système de commande se dégage, que la cabine s'immobilise et que l'alarme se déclenche.

Fermeture de sécurité de la porte. Vérifier les dispositifs suivants :

- **Interrupteur de la porte.** S'assurer que lorsque la porte au niveau du pont promenade est ouverte, la cabine ne peut amorcer de montée ou de descente. Vérifier les commandes aux deux paliers.
- **Dispositif de verrouillage.** S'assurer que la porte demeure verrouillée lorsqu'elle se trouve à une distance de 2 à 4 pouces du palier. Si ce n'est pas le cas, demander à un technicien qualifié de faire les réglages nécessaires.
- **Porte coulissante de la cabine.** S'assurer qu'aucune commande ne fonctionne lorsque la porte coulissante est ouverte.

Placer et régler la rampe de manière qu'elle soit alignée avec la plate-forme lorsque celle-ci se trouve au palier inférieur. Cette opération requiert l'intervention des deux préposés.

- Au niveau du pont principal (pont des véhicules), un préposé doit toujours aider les passagers en fauteuil roulant à stationner leur voiture, pousser leur fauteuil jusqu'à la plate-forme et les aider à y prendre place.

- Lorsque le passager se trouve dans la cabine, le deuxième préposé doit fermer la porte coulissante et mettre le verrou de métal afin d'empêcher la porte de s'ouvrir.

- Le préposé doit s'assurer que le **dispositif de stationnement est en position d'arrêt** et que la clé correspondante ne se trouve pas dans l'interrupteur, comme on l'a mentionné plus haut.

- Une fois que la porte coulissante est bien verrouillée, le préposé doit placer l'interrupteur approprié (de la cabine) en position de marche et appuyer sur le bouton noir n° 2 pour faire monter la plate-forme jusqu'au pont promenade.

- Lorsque la plate-forme se trouve au niveau du palier du pont promenade, le préposé doit placer l'interrupteur en position d'arrêt, retirer la clé et ouvrir la porte coulissante et la porte de la plate-forme. Il doit ensuite aider le passager en fauteuil roulant à sortir à reculons de la plate-forme. Après avoir quitté la plate-forme, le préposé doit déverrouiller et ouvrir la porte extérieure, en veillant à ce qu'aucun passager ne se trouve près de l'ouverture de la porte battante. Après avoir franchi cette porte, il doit indiquer au passager où se trouve la porte à l'usage des personnes handicapées donnant accès au salon (à l'arrière du pont). Le préposé doit fournir au passager toute l'aide dont il a besoin. Si la personne handicapée n'a plus besoin d'aide, le préposé peut retourner sur le pont principal. Pour ce faire, le deuxième préposé, sur le pont principal, doit en même temps appuyer sur le bouton de palier pour assurer une descente en toute sécurité de la plate-forme.

- Avant de descendre, le préposé, qu'il soit seul ou avec un passager, doit observer les consignes suivantes :

  - verrouiller la porte extérieure de la plate-forme;
  - fermer la porte de la plate-forme;

- fermer et verrouiller la porte coulissante et s'assurer que le passager se tient éloigné de celle-ci; il doit également éviter tout contact avec cette porte lorsque la plate-forme fonctionne;
- s'assurer que la clé du dispositif de stationnement n'est pas insérée dans l'interrupteur correspondant;
- s'assurer que le dispositif de stationnement est en position d'arrêt (c'est-à-dire verticale) et que le voyant rouge sur le tableau de commande est éteint;
- tourner l'interrupteur à clé (cabine);
- appuyer sur le bouton noir n° 1, en exerçant une pression constante, pour descendre;
- Nota : le préposé se trouvant sur le pont principal doit aussi appuyer sur le bouton de palier pour assurer la descente en toute sécurité de la plate-forme;
- le préposé du pont principal doit attendre pour ouvrir la porte coulissante que la cabine soit bien immobilisée et que la rampe soit placée comme il se doit; il doit ensuite aider le passager à descendre de la rampe et à se rendre jusqu'à sa voiture.

3.4 STATIONNEMENT DE LA PLATE-FORME

On doit stationner la plate-forme au palier supérieur, c'est-à-dire au niveau du pont promenade, lorsque le traversier est en service. Avant de stationner la plate-forme et de la verrouiller, toujours mettre le dispositif de stationnement en position de marche. On doit également verrouiller la porte extérieure. Toutefois, durant la nuit ou lorsque le traversier n'est pas en service pour une période prolongée, stationner la plate-forme au palier inférieur pour réduire au minimum les risques de corrosion du piston hydraulique.

Le capitaine peut décider, si la mer est grosse ou par grands vents, de stationner la plate-forme au palier inférieur.

3.5 MODE D'UTILISATION DU DISPOSITIF DE STATIONNEMENT

- Pour verrouiller et stationner la plate-forme au palier supérieur (pont promenade), procéder comme suit :

  - faire monter la cabine au palier supérieur (pont promenade) en appuyant sur le bouton noir n° 2 et s'assurer que la clé ronde (clé du dispositif de stationnement), à gauche sur le tableau de commande, n'est pas dans l'interrupteur;
  - ouvrir la porte de l'armoire aménagée sous le tableau de commande de la cabine;
  - pousser la tige de commande d'environ deux pouces vers le bas et la tourner de 90 degrés dans le sens horaire jusqu'à ce qu'elle soit bien verrouillée; le voyant rouge devrait s'allumer, indiquant que la plate-forme est bloquée au palier supérieur;
  - retirer la clé carrée de l'interrupteur de la cabine.

- Pour déverrouiller la plate-forme :

  - ouvrir la porte de l'armoire aménagée sous le tableau de commande de la cabine;
  - tourner la tige de commande dans le sens antihoraire d'environ 90 degrés afin de la dégager et la mettre en position verticale;
  - le voyant rouge devrait s'éteindre, indiquant que le dispositif de stationnement est dégagé et que la plate-forme est prête à utiliser;
  - si le voyant rouge ne s'éteint pas, procéder comme suit :
    - insérer la clé ronde dans l'interrupteur muni d'une plaque rouge, à gauche sur le tableau de commande, et la tourner dans le sens horaire pendant 1/2 à 1 seconde;
    - après cette manoeuvre, la plate-forme devrait monter d'environ 3,8 cm (1 à 1/2 po), ce qui suffira à dégager le dispositif de stationnement;
    - le voyant rouge devrait alors s'éteindre, indiquant que la plate-forme est prête à utiliser;
    - retirer ensuite la clé ronde et la ranger à l'endroit approprié.

NOTA : *On ne doit jamais tourner la clé ronde lorsque la plate-forme se trouve au palier supérieur, sans s'être assuré que le dispositif de stationnement est bien dégagé, car la plate-forme montera à sa position la plus haute et ira s'appuyer contre les butées des rails. Si cela arrive, il sera impossible de faire descendre la plate-forme et de dégager le dispositif de stationnement. Si la situation se présente, on doit faire appel à un technicien qualifié pour dégager le dispositif de stationnement.*

4.0 ENTRETIEN

Il est très important de procéder à l'entretien périodique de la plate-forme élévatrice pour la garder en bon état de marche. En tant que propriétaire de ce matériel, rappelez-vous qu'il est de votre responsabilité de veiller à ce qu'il soit entretenu à intervalles réguliers. On recommande fortement de lubrifier les rails de la plate-forme avec une huile légère, chaque fois que le besoin s'en fait sentir.

En raison de la complexité de la plate-forme, faire appel seulement à un distributeur autorisé Concord pour tous les travaux d'entretien et de réparation.

Pour s'assurer que la plate-forme est en bon état de marche, faire appel à une personne autorisée tous les six à douze mois pour effectuer les travaux d'entretien et d'inspection suivants. Toutefois, des inspections plus fréquentes peuvent être nécessaires, suivant le taux d'utilisation de la plate-forme.

- lubrifier les rails avec une huile légère (ne pas utiliser de graisse);
- lubrifier les charnières de porte et régler au besoin les dispositifs de fermeture des portes;
- vérifier si le câble est usé; si l'enveloppe est coupée ou abîmée, remplacer le câble;
- vérifier si des tuyaux fuient; si c'est le cas, remplacer ou resserrer les raccords;
- vérifier le niveau d'huile du réservoir de la pompe et en ajouter au besoin (utiliser seulement de l'huile hydraulique Hydra-Flo 32);
- resserrer les raccords de tuyaux ou robinets de purge desserrés; vérifier si le vérin hydraulique fuit; au besoin, remplacer les garnitures d'étanchéité.

MISE EN GARDE: *Faire appel seulement à un technicien autorisé Concord pour le réglage des dispositifs de commande de la pompe ou des robinets. Les robinets sont préréglés en usine. Tout réglage effectué par une personne non autorisée peut endommager le matériel.*

On trouve à l'annexe B un spécimen du contrat d'entretien préparé par Handicap Equipment Ltd., l'entreprise qui installe les plates-formes.

5.0 DÉPANNAGE DU SYSTÈME DE TRANSPORT VERTICAL

Avant d'appeler un agent autorisé

Pour éviter de faire venir inutilement un technicien autorisé, consulter le présent guide d'exploitation et vérifier les points suivants.

Si la plate-forme ne fonctionne pas:

- vérifier si un fusible est mort ou un disjoncteur déclenché à l'alimentation principale dans la salle de la pompe;
- vérifier si les sectionneurs sont en position de marche dans la salle de la pompe;
- vérifier si le bouton d'arrêt d'urgence est actionné;
- vérifier si la clé carrée située à droite sur le tableau de commande est placée en position de marche;
- vérifier si la porte coulissante de la cabine est complètement fermée;
- vérifier le bouton de remise en marche du moteur et l'actionner s'il est déclenché (peut aussi être sur le tableau de commande).

Si la plate-forme ne fonctionne toujours pas, communiquer avec votre distributeur autorisé Concord.

5.1 LISTE DE PIÈCES

5.2 FOURNISSEURS

W. R. Davis Engineering Ltd.
1260, chemin Old Innes
Ottawa (Ontario) K1B 3V3
Tél. : (613) 748-5500
Télécopieur : (613) 748-3972

Handicap Equipment Ltd.
P.O. Box 7391
St. John's (Terre-Neuve) A1E 4V8
Tél. : (709) 745-2182
Télécopieur : (709) 745-6461

Concord Elevator
10 Whitmore Road
Woodbridge (Ontario) L4L 7Z4
Tél. : (416) 856-3030
Télécopieur : (416) 851-6556

ANNEXE A

PERSONNES-RESSOURCES

NOM	TITRE	ORGANISME	OBJET
M. Adri Coppens	Directeur Génie mécanique	W.R. Davis Engineering Ltd. (613) 748-5500	Administration générale des contrats, conception évaluation
M. Paul Belloni	Ingénieur de projet	W.R. Davis Engineering Ltd. (613) 748-5500	Coordination de projet, conception, fabrication, évaluation
M. Gord Patterson	Architecte naval coordonnateur de conception	Groupe ECS Div. German & Milne (613) 230-6201	Conception détaillée, fabrication
Mme Barbara A. Smith	Agent de programme - besoins spéciaux	Centre de développement des transports (514) 283-0020	Mise en oeuvre du Smith projet
M. Xavier Schnelli	Gestionnaire de projet	Transports Canada (ACFA) Programme des travaux mar. (613) 998-1854	Politique et programmes maritimes
M. Paul McInerney	Gestionnaire de projet	Behavioral Team (416) 656-6676	Évaluation ergonomique
M. David Balmer	Vice-président	Concord Elevator (416) 856-3030	Conception et fabrication du système de transport vertical
M. Hugh McGarvie	Président	Handicap Equipment (709) 745-2182	Fourniture et installation du système de transport vertical
M. Vic Rakowsky	Directeur technique	Pictou Industries (902) 485-8001	Modifications de navire
Capitaine Dan Panting	Capitaine M. V. Prince Edward	Northumberland Ferries Ltd. (902) 485-6412	Exploitation de navires

ANNEXE B

SPÉCIMEN DE
CONTRAT D'ENTRETIEN DU SYSTÈME DE TRANSPORT VERTICAL

HANDICAP EQUIPMENT LTD.
Entretien des plates-formes élévatrices

P.O. Box 7391
St. John's (T.-N.)
A1E 4V8

Tél.: (709) 745-2182
Télécopieur: (709) 745-6461

Destinataire : Davis Engineering Limited
1260, chemin Old Innes
Ottawa (Ontario)
K1B 3V3

St. John's (T.-N.)
Le 25 février 1991

Par la présente, nous nous engageons à faire l'entretien de la ou des plate(s)-forme(s) élévatrice(s) hydraulique(s) qui se trouveront chez ***Pictou Industries, Pictou, Nouvelle-Écosse, lorsque le navire sera remisé pour fins de révision annuelle.***

En vertu de ce contrat, nous ferons l'entretien de la ou des plate(s)-forme(s) conformément aux conditions stipulées ci-après. Le travail sera exécuté par du personnel employé, formé et supervisé par nous.

PORTÉE DU SERVICE : Nous exécuterons les travaux de nettoyage, de réglage et de graissage conformément aux directives de nos manuels d'entretien.

PIÈCES ET FOURNITURES : Nous nous engageons à fournir les huiles, les produits de nettoyage et la graisse nécessaires. Les pièces à remplacer seront aux frais du propriétaire. Les pièces changées devront être remises au propriétaire. Frais de main-d'oeuvre pour l'installation des pièces en sus.

CALENDRIER : Les travaux stipulés au présent contrat devront être effectués
une fois par mois________
deux fois par année______
une fois par année___X___

HANDICAP EQUIPMENT LTD.
Entretien des plates-formes élévatrices

COÛT DU CONTRAT : Mille deux cent cinquante e dollars (1 250 $).

ANNUEL

Les travaux d'entretien débuteront le .... jour de.....avril....1992 et se poursuivront jusqu'à ce qu'ils soient terminés. L'une ou l'autre des parties peut mettre fin au contrat sur préavis de 90 jours.

La présente proposition, acceptée par le soussigné et approuvée par nous, constitue le contrat qui lie les deux parties.

Soumis pour **Handicap Equipment Ltd.**, par Monsieur Hugh McGarvie.

En date du ....19...

Signature du client.......................................

Nom et titre: ....

Copie du client

APPENDIX F

EVALUATION QUESTIONNAIRES

APPENDIX F1

EVALUATION QUESTIONNAIRE FOR PASSENGERS

W.R. Davis Engineering Limited

1260 Old Innes Road
Ottawa, Ontario
Canada K1B 3V3
Tel.: (613) 748-5500
Telex: 053-3862
Fax: (613) 748-3972

Davis

W.R. DAVIS ENGINEERING LIMITED

OTTAWA, ONTARIO

The Transportation Development Centre (TDC) Policy and Coordination Group of Transport Canada has funded the design and installation of the Level Change System on board the MV Prince Edward Ferry. TDC has retained Davis Engineering Ltd. to survey passengers of the lift system in order to determine the level of satisfaction with the present lift system and to collect information for future designs.

The survey should take less than 5 minutes to complete.

Please return your survey either by mail in the postage prepaid envelope provided or by placing it in the "SURVEY DROP BOX" located inside the lift system.

If you would like to, please include your name and phone number so that we can call you to obtain your comments on the lift system.

Thank you for your cooperation.

Davis

PASSENGER LIFT SYSTEM EVALUATION

QUESTIONNAIRE FOR PASSENGERS

The information collected from this survey is strictly confidential. The information will be used to enhance the design of the passenger lift system to serve you and others better in the future. If you have any questions regarding the purpose, intent, content, or confidentiality of this questionnaire please contact DAVIS at 613-748-5500, 1260 Old Innes Road, Ottawa, Ontario, K1B 3V3. Please use the attached and stamped envelope to return the completed questionnaire.

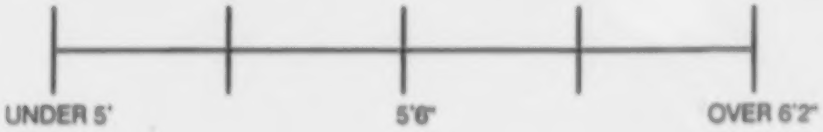
Thank you for your cooperation.

Date Lift Used: ___________

GENERAL BACKGROUND INFORMATION

Q/1	Sex **(circle one)**	male	female
	Age Category **(circle one)**	under 25	25-45
		46-65	over 65

Q/2 Your height **(place a mark on the line that corresponds to your current height)**



Q/3 Your weight **(circle one)**

under 150 lbs 150-200lbs over 200 lbs

Q/4 How often do you use a mobility aid?

1 2 3 4 5

Never Sometimes All the time

Are you using a mobility aid on this trip?

YES NO

If YES, please check all of the aids below that apply to you.

☐ Manual wheelchair

☐ Scooter

☐ Guide dog

☐ Other _________

☐ Electric Wheelchair

☐ Long cane

☐ Crutches

For each of the questions below, please circle the number that best describes your feelings regarding to the passenger lift system.

Q/5 How would you rate the passenger lift system's effectiveness in facilitating the access to the passenger deck of the ferry:

1 2 3 4 5

Poor Excellent

____

____

Q/6 How would you rate the interior appearance of the lift system?

1 2 3 4 5

Poor Excellent

Q/7 How would you rate the exterior appearance of the lift system?

1 2 3 4 5

Poor Excellent

Q/8 How would you rate your ride comfort while using the lift?

1 2 3 4 5

Uncomfortable Adequate Very comfortable

Q/9 How would you rate the ease of changing levels between the car deck and passenger deck with the lift?

1 2 3 4 5

Difficult Adequate Very easy

Q/10 How would you rate the placement of hand rails?

1 2 3 4 5

Inconvenient Convenient

Q/11 How would you rate the system's accommodation for your mobility aid (i.e. wheelchair, cane, walker, etc.)?

1 2 3 4 5

Poor Acceptable Excellent

Q/12 Do you find the motion (if any) of the lift system excessive while in operation?

1 2 3 4 5

Excessive Acceptable Very smooth

Q/13 How important is it to be able to see out of the passenger lift system during the ride?

1 2 3 4 5

Not important Very important

Q/14 How safe did you feel during the transfer process?

1	2	3	4	5
Not safe		Safe		Very safe

Q/15 How would you rate the interior size of the lift system?

1	2	3	4	5
Too small		Just right		Too large

Q/16 How would you rate the amount of interior lighting?

1	2	3	4	5
Too little		Just right		Too bright

Q/17 Do you find the type and location of signs identifying and directing lift users to and from the lift adequate, clear and easily understood?

1	2	3	4	5
Not adequate		Adequate		Excellent

Q/18 Would you be more or less likely to use a ferry system if a lift system is available?

1 2 3 4 5

Less likely No change More likely

Q/19 Have you ever been assisted while changing deck levels on a ferry in the past?

Yes No

If yes, please describe the methods other than the current one that were used to assist in moving from one deck level to another.

METHODS (brief description)

1.
2.
3.
4.
5.

Most preferred, and why?

Most disliked and why?

Please list below any comments or suggestions you would like to make about the passenger lift system or about this survey.

Thank you for your participation.

APPENDIX F2

QUESTIONNAIRE FOR OPERATORS

Davis

PASSENGER LIFT SYSTEM EVALUATION

QUESTIONNAIRE FOR OPERATORS

The information collected from this survey is strictly confidential. The information will be used to improve the design of the passenger lift system to serve you and others better in the future. If you have any questions regarding the purpose, intent, content, or confidentiality of this questionnaire please contact DAVIS at 613-748-5500, 1260 Old Innes Road, Ottawa, Ontario, K1B 3V3.

Thank you for your cooperation.

Date Lift Used: ___________

GENERAL BACKGROUND INFORMATION

Q/1	Sex (circle one)	male	female
	Age Category (circle one)	under 25	25-45
		46-65	over 65

Q/2 Your height (place a mark on the line that corresponds to your current height)

UNDER 5' 5'6" OVER 6'

Q/3 Your weight (circle one)

under 150 lbs 150-200 lbs over 200 lbs

Q/4 What percentage (%) of your time at work is spent assisting elderly or handicapped passengers for the purpose of changing deck levels? **(circle one)**

under 25%   25-50%   50-75%   over 75%

Q/5 Current job title and responsibility.

___

___

___

Q/6 Have you ever operated this lift system previous to this time?

YES   NO

If YES, please list the number of times you operated the lift from the cab ________

Please list the number of times you operated the lift from the deck ________

For each of the questions below, circle the number that best describes your opinion.

Q/7 How would you rate the passenger lift system's effectiveness in facilitating access between the main and passenger decks?

1   2   3   4   5

Poor   Adequate   Excellent

___

___

Q/8 How would you rate the appearance of the lift system?

1 2 3 4 5

Poor Adequate Excellent

Q/9 How would you rate the ride comfort?

1 2 3 4 5

Uncomfortable Comfortable Very comfortable

Q/10 How would you rate the ease of assisting a disabled passenger to enter and exit the lift?

1 2 3 4 5

Awkward Easy Very easy

Q/11 How would you rate the placement of hand rails?

1 2 3 4 5

Poor Adequate Excellent

Q/12 How would you rate the ease of door opening and closing?

1 2 3 4 5

Poor Excellent

Q/13 How would you rate the system's accommodation for mobility aids (i.e., wheelchair, cane, walker, etc.)?

1 2 3 4 5

Inadequate Adequate Excellent

Q/14 Do you find the motion of the passenger lift system smooth?

1 2 3 4 5

Not smooth Smooth Very smooth

Q/15 How would you rate the visibility from within the lift system?

1 2 3 4 5

Poor Adequate Excellent

Q/16 How comfortable are the passengers during the transfer process?

1 2 3 4 5

Uncomfortable Comfortable Very comfortable

Q/17 How would you rate the internal size of the lift system?

1 2 3 4 5

Too small Just right Too large

Q/18 How would you rate the amount of interior lighting?

1 2 3 4 5

Too little Just right Too bright

Q/19 How you find the temperature inside the lift system?

1 2 3 4 5

Too cold Just right Too hot

Q/20 Are you more or less willing to accept the responsibility of assisting elderly and disabled passengers change deck levels with the lift system as compared to without the lift system?

1 2 3 4 5

Less likely No change More likely

Q/21 How clear is the communication system between the other operator and yourself?

1 2 3 4 5

Not clear Sufficient Very clear

Q/22 How would you rate the control system in the lift for clarity of instruction?

1 2 3 4 5

Poor Sufficient Excellent

Q/23 How would you rate the control system for ease of operation?

1 2 3 4 5

Poor Adequate Excellent

Q/24 How would you rate the ease of positioning the portable ramp?

1	2	3	4	5
Poor		Adequate		Easy

Q/25 How would you rate the ease of storing the portable ramp?

1	2	3	4	5
Poor		Adequate		Easy

Q/26 How would you rate the total system reliability?

1	2	3	4	5
Poor		Adequate		Excellent

Please list all system problems, or breakdowns with a brief description and date of occurrence.

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

Q/27 How does the system operate under extreme weather conditions?

1 2 3 4 5

Poor Adequate Excellent

____

____

Q/28 How is the system standing up to the corrosive environment relative to other ship systems?

1 2 3 4 5

Poor Adequate Excellent

____

____

Q/29 How would you rate the access to the system at the car deck?

1 2 3 4 5

Poor Adequate Very good

____

____

Q/30 How would you rate the access to the system at the passenger deck?

1 2 3 4 5

Poor Adequate Very good

____

____

Q/31 How would you rate the instructional and operations signs provided?

1	2	3	4	5
Poor		Adequate		Excellent

Q/32 How would you rate the extent to which a lift user disrupts normal boarding/disembarking procedures (as compared to assisting a person up the stairs)?

1	2	3	4	5
Much more disruption		Same as without lift system		Much less disruptive

Q/33 Have you ever assisted elderly and handicapped passengers to move between the car deck and the passenger deck in the past?

Yes No

If yes, please describe the methods (other than the current one) that were used.

METHODS (brief description)

1. ______
2. ______
3. ______
4. ______
5. ______

Which method is preferred, and why?

Which method is most disliked and why?

Please list any suggestions to improve safety.

Please list any suggestions to improve customer satisfaction.

Please list below any other factors that you believe should be included in the evaluation along with any other comments on the survey and/or the passenger lift system.

Thank you for your participation.

APPENDIX G1

PASSENGER QUESTIONNAIRE RESULTS

PASSENGER LIFT SYSTEM EVALUATION PASSENGER QUESTIONNAIRES

FILE: 01-08.04

1=M
2=F

1=<25
2=25-45
3=45-65
4=>65

1=<5'
2=5'-5'3"
3=>5'3"-5'6"
4=>5'6"-5'10"
5=>5'10"-6'3"
6=>6'3"

1=<100LBS
2=100-200LBS
3=>200LBS

1=NEVER
5=ALWAYS

1=YES
2=NO

1=MAN CHAIR
2=ELEC CHAIR
3=SCOOTER
4=CANE
5=DOG
6=CRUTCHES
7=OTHER

RATED

NO	DATE RECEIVED	DATE USED	Q1 SEX	Q1 AGE	Q2 HEIGHT CATEGORY	Q3 WEIGHT CATEGORY	Q4 AID FREQ	Q4 ON THIS TRIP	Q4 AID CATEGORY	Q5 EFFECTIVE	Q6 INT	Q7 EXT	Q8 COMFORT
1	02-Aug-01	27-Jul-01	2	4	3	2	4	2		5	4	5	5
2	01-Aug-01	27-Jul-01	2	3	3	3	3	2		5			
3	01-Aug-01	28-Jul-01	2	4	3	3	5	1	4	5	3	5	5
4	01-Aug-01	24-Jul-01	2	3	2	1	3	1	6	5	4	4	3
5	01-Aug-01	25-Jul-01	1	2	3	1	1	2		2	3	2	3
6	28-Jul-01	28-Jul-01	2	3	3	1	5	1		5	5	5	5
7	28-Jul-01	21-Jul-01	2	3	3	2	3	1	4	4	3	3	3
8	28-Jul-01	20-Jul-01	1	1	3	1	5	1	1	5	5	5	5
9	28-Jul-01	23-Jul-01	1	2	2	1	5	1	1	4	4	4	3
10	28-Jul-01	19-Jul-01	2	4	2	2	3	2		5	5	5	5
11	28-Jul-01	20-Jul-01	2	2	1	5	1	1	3	5	5	5	5
12	28-Jul-01	20-Jul-01	2	4	3	2	4	1	2	5			4
13	28-Jul-01	01-Jul-01	2	4	2	2	5	1	1		5	5	5
14	28-Jul-01	20-Jul-01	1	3	4	1	3	2		5	5	5	5
15	28-Jul-01	01-Jul-01	1	4	6	2	5	2		5	5	4	5
16	08-Aug-01	27-Jul-01	2	4	2	2	5	1	4	2	4	4	5
17	08-Aug-01		1	2	5	3	1	1		4	5	3	4
18	08-Aug-01	30-Jul-01	2	2	3	3	5	1	4	4	5	5	5
19	12-Aug-01	04-Aug-01	1	1	3	3	5	1	2	4.5	5	5	5
20	13-Aug-01		2	4	3	1	3	1		5	5	5	5
21	20-Aug-01	11-Aug-01	2	3	3	1	5	1	1	5	4	4	5
22	23-Aug-01	17-Aug-01	2	3	4	3	5	1	4	4	4	4	4
23	23-Aug-01	25-Jul-01	2	4	3	1	5	1	4	5	5	5	5
24	28-Aug-01	22-Aug-01	1	2	5	2	5	1	1	5	5	5	5
25	29-Aug-01	25-Aug-01	2	4	2	3	5	1	1	5	5	5	5
26	03-Sep-01	27-Aug-01	1	2	3	1	4	1	1	4	4	3	4
27	25-Sep-01	27-Aug-01	2	4	2	1	5	1	2	5	4	4	3
28	05-Sep-01	23-Aug-01	2	4	3	2	1	1		5	5	5	5
29	06-Sep-01						1	2		5			
30	08-Sep-01	28-Aug-01	2	3	4	2	5	1	1	5	5	5	5
31	11-Sep-01	25-Jul-01	2	2	2	3	1.5	1	6	5	3	3	5
32	12-Sep-01	13-Aug-01	2	4	2	1	5	1	1	4	3	1	3
33	17-Sep-01	17-Aug-01	1	1	5	2	5	1	1	5	3	4	5
34	12-Sep-01	27-Aug-01	2	2	4	1	3	1	1	2	2	2	2
35	17-Sep-01	28-Aug-01	2	4	2	1	4	1	4	5	5	4	5
36	17-Sep-01	31-Aug-01	2	4	3	2	3.5	1	4	3.5	3	3	3
37	25-Sep-01	01-Sep-01	2	4	3	2	5	1	4	5	5	5	5
38	25-Sep-01	[illegible]8-Sep-01	2	2	2	1	5	1	4	5	5	5	5
40	24-Sep-01	14-Aug-01		4	2	2	2	2	4	5	5	2	5
39	23-Oct-01	19-Oct-01	2	4	3	1	5	1	1	4	3	3	4
N	40	37	38	38	38	38	40	40	28	39	37	37	38
AVG							3.88			4.44	4.33	4.05	4.33
STD							1.43			0.88	0.87	1.08	0.84

1=SMALL 1=DIM 1=POOR 1=LESS

2=OK 2=OK 2=NO CHNG

FROM 1(POOR) TO 5 (EXCELLENT) | 1=YES 1=LIFT

3=LARGE 3=BRIGHT 3=EXCLNT 3=MORE 2=NO 2=OTHER

NO.	Q9 EASE	Q10 HAND RAILS	Q11 ACCESS FOR AID	Q12 MOTION	Q13 IMPORT OF VIS	Q14 SAFETY	Q15 SIZE	Q16 LIGHT	Q17 SIGNS	Q18 FERRY V/ LIFT	Q19 ASSIST BEFORE	Q19 MOST PREF
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1
2		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	
3	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	1	
4	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
5	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	1	[illegible]	[illegible]	[illegible]	1	
6	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	
8	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	
9	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	1	1
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	
11	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1
12	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	1	[illegible]	[illegible]	[illegible]	1	[illegible]
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
14	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1
15	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	1	[illegible]	[illegible]	
17	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	1	[illegible]	[illegible]	[illegible]	1	1
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	
19	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1
20	[illegible]	[illegible]		[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
21	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
24	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	1	[illegible]	1		
25	[illegible]		[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1
26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	1	[illegible]	1	
27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	1	1
28	[illegible]	[illegible]		[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	
29		[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
30	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	
31	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	
32	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
33	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
34	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	1	[illegible]	1	[illegible]	[illegible]	
35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
36	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1
37	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
38	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
39	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1
40	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	1	[illegible]	1	[illegible]
N	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
AVG	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
STD	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

PASSENGER	QUESTION	PASSENGER COMMENTS
1	6	Small but efficient.
	8	Courteous attendants.
	9	High step from car deck.
	12	Better than stairs.
	17	Hard to notice signs.
	General	Survey too long. Should have lift on all vessels.
4	General	Beats taking stairs.
5	General	Would prefer user operated system.
8	General	Should have lifts on all vessels
9	General	Does not like to be carried. Would prefer user operated system. Should have lifts on all vessels.
10	15	Could be larger.
	General	Courteous crew.
11	11	Room for walker and scooter in vehicle.
	General	Lift preferred over cargo elevator.
12	General	Stressful to be carried. Preferred user operated system.
13	5	Waiting line for lift.
	General	Inconvenient having to find ferry with handicap assistance.
14	General	Previously required help of two people.
16	8	Jerky ride.
	17	Dangerous lack of visible signs. User was standing underneath elevator.
	General	Would like a bell to signal operator. Would like a second elevator.
17	General	Prefers lift to being carried.
19	General	Prefers lift to being carried or to escalator.
21	General	Should have lifts on all ferries.
22	General	Prefers user operated elevator. Dislikes having to wait for the only ferry with the lift system.
23	General	Lift is a great improvement.

PASSENGER	QUESTION	PASSENGER COMMENTS
26	General	Dislikes all methods requiring assistance from crew. Finds access ramp too steep. Finds exit from lift difficult because of the two doorways.
27	17	More signs needed.
	18	Needs to use ferry due to location, regardless of presence or lack of lift system.
	General	Finds being carried degrading.
28	General	Hates climbing stairs.
30	9	Hard to step onto lift from car deck.
31	17	Didn't notice any signs
32	7	Exposed lift caused come leeriness. Had never seen anything quite like this system.
	9	The ramp is too steep for a handicapped wheelchair user to negotiate on their own. Need to be independent.
	18	Waited for this specific ferry so that we could use the lift.
35	General	Would like to see all ferries have an elevator. Have to travel, but have not gone to PEI for several years because of my disability. There is a real need for elevators for the elderly and disabled.
37	5	I think it should have been installed years ago. Due to a bad heart condition, my husband had to stay on the car deck for the last 20 years of using the ferry system. Therefore I think this system is excellent.
	14	Good crew.
	17	Surprised. Did not know the lift system was on-board.
	19	This system should be on all ferries.
38	19	Elevator or some kind of lift is preferred.
	General	Should have a lift system on each boat. Should have a ramp on the lower level so a wheelchair can be rolled right in, rather than any step.

PASSENGER	QUESTION	PASSENGER COMMENTS
39	19	Used this ferry two years ago, had to be lifted and carried up the stairs. Elevator preferred. Hand assistance uncomfortable and slow. Better direction needed in finding access to the lift or persons responsible for its operation.
40	General	Was treated most courteous when using the elevator.

APPENDIX G2

OPERATOR QUESTIONNAIRE RESULTS

PASSENGER LIFT SYSTEM EVALUATION OPERATOR QUESTIONNAIRES

FILE: 91-36.04

			1=M 2=F	1=<25 2=25-45 3=45-65 4=>65	1=<5' 2=5'-5'3" 3=>5'3"-5'6" 4=>5'6"-5'9" 5=>5'9"-6' 6=>6'	1=<150LBS 2=150-200LBS 3=>200LBS	1=<25% 2=25-50% 3=50-75% 4=>75%	1=DRIVER 2=MATE	1=YES 2=NO			
NO	DATE RECEIVED	DATE USED	Q1 SEX	Q1 AGE	Q2 HEIGHT CATEGORY	Q3 WEIGHT CATEGORY	Q4 ASSIST PERCENT	Q5 JOB TITLE	Q6 OPER BEFORE	Q6 % CAB	Q6 % DECK	Q7 EFFECTIVE
1	20-Aug-91		1	1	4	2	1	1	1	10	8	3
2	20-Aug-91	17-Aug-91	1	2	5	3	1	1	1	25	3	4
3	20-Aug-91	12-Aug-91	1	2	4	2	2	2	1	5	4	5
4	21-Aug-91		1	1	5	2	1	1	1	4	4	3.5
5	21-Aug-91	20-Jul-91	1	1	5	1	1	1	2			4
6	21-Aug-91		1	2	4	2	1	1	1	2	2	4
7	12-Aug-91	20-Aug-91	1	1	4	2	1	1	2			4
8	12-Aug-91	09-Aug-91	2	2	1	1	1	1	2			4
9	12-Aug-91		1	1	5	2	1	1	1	2	2	4
10	21-Sep-91	27-Aug-91	1	1	4	1	1	1	1	25	20	3
N	10	8	10	10	10	10	10	10	10	7	7	10
AVG										13.71	8.86	3.85
STD										12.77	7.94	0.57

	RATED FROM 1 (POOR) TO 5 (EXCELLENT)										1=SM	1=DIM	1=COLD	1=LESS
											3=OK	3=OK	3=OK	3=NO CHG
											5=LG	5=BRT	5=HOT	5=MORE
NO.	Q7 EFFECTIVE	Q8 APPEAR	Q9 COMFORT	Q10 EASE ASSIST	Q11 HAND RAILS	Q12 DOORS	Q13 ACCOM. FOR AID	Q14 MOTION	Q15 VIS.	Q16 TRANSFER COMFORT	Q17 SIZE	Q18 LIGHT	Q19 TEMP	Q20 RESP.
1	3	4	3	2	5	1	3	3	2	4	2	3	3	5
2	4	4	3	4	3	4	3	4	3	4	3	4	3	3
3	5	5	5	5	5	5	5	4	3	3	1	3	3	5
4	4.5	4	2.5	2	4	3.5	2.5	4	3	3	2	3		3
5	4	3	4	3	3	3	4	4	3	3	3	3	3	5
6	4	4	5	4		4	4	4	4	3	2	3	3	5
7	4	4	3	3	2	2	3	3	1	3	3	3	5	5
8	4	3	3	3	3	3	2	3	3	3	2	3	3	3
9	4	4	4	3	3	4	3	3	1	3	1	3	3	5
10	3	2	4	2	3	1	2	3	2	3	1	3	3	3
N	10	10	10	10	9	10	10	10	10	10	10	10	9	10
AVG	3.95	3.70	3.65	3.10	3.44	3.05	3.15	3.50	2.50	3.20	2.00	3.10	3.22	4.20
STD	0.57	0.78	0.84	0.94	0.96	1.27	0.90	0.50	0.92	0.40	0.77	0.30	0.63	0.98

1=LESS

3=SAME

5=MORE

1=YES
2=NO

1=LIFT
2=OTHER

RATED FROM 1 (POOR) TO 5 (EXCELLENT)

NO.	Q21 COMM.	Q22 CONTROL INSTR.	Q23 CONTROL EASE	Q24 RAMP USE	Q25 RAMP STORE	Q26 RELIABLE	Q27 EXTREME WEATHER	Q28 CORRO-SION	Q29 ACCESS CAR	Q30 ACCESS PASS.	Q31 SIGNS	Q32 DISRUPT	Q33 ASSIST BEFORE	Q34 MOST PREF.
1	2	3	3			4			4		2	4	1	
2	4	4	4	4	3	4	3	4	3	4	3	4	1	1
3	3	4	4	3	3	4	4	4	4	[illegible]	4	5	1	1
4	4	3	4	3	3	2.5	3	5	3.5	[illegible]	3	5	1	1
5	3	3	3	2	2	3	3	3	3	3	3	3	2	
6	5	5	5	4	4	4		4	4	4	4	5	1	1
7	5	4	5	3	3	4		3	3	5	5	5	1	1
8	3	3	4	3	3	3	3	3	2	4	3	5	2	1
9	2	3	4	4	3	3			3	3	3	3	1	1
10	2	2	2	2	2	3	2	1	3	2	3	2	1	
N	10	10	10	9	9	10	6	8	10	9	10	10	10	7
AVG	3.30	3.40	3.80	3.11	2.89	3.45	3.00	3.38	3.25	3.44	3.30	4.10		
STD	1.10	0.80	0.87	0.74	0.57	0.57	0.58	1.11	0.60	0.96	0.78	1.04		

OPERATOR	QUESTION	OPERATOR COMMENTS
1	12	Too many doors.
	24	Nuisance to position ramp.
	25	Nuisance to store ramp.
	27	Has not used system under extreme weather conditions.
	28	Too soon to evaluate corrosion resistance.
	30	Doors are cumbersome.
	General	Dangerous clearance between door and overhead. Fingers could easily get caught.
2	General	Put a handle on the inside of the exterior door to help close it on windy days. Elevator preferred to carrying people for safety and convenience.
3	General	Elevator preferred to carrying people for safety and ease of movement.
4	9	Slightly cramped when unloading and loading on the passenger deck.
	19	Temperature inside depends on weather.
	General	Elevator is easier than carrying.
5	General	Elevator easier and safer than carrying passengers.
7	19	Temperature inside is too hot when it is hot outside.
	27	System has not yet been operated under extreme weather conditions.
	General	Elevator safer and easier than carrying passengers.
8	General	Elevator safer and easier than carrying passengers.
9	27	System not yet operated under extreme weather conditions.
	28	Too soon too evaluate corrosion resistance.
	General	Elevator safer than carrying passengers.
10	20	Do not have any choice.
	24	Extra work.
	25	Extra work.
	28	Rusting, take a look.

OPERATOR	QUESTION	OPERATOR COMMENTS
10	33	Yes, carried passengers.
	General	A shut off switch similar to automatic garage doors should be installed. Mobile ramp is useless, why not use a ramp such as on a moving truck which slides under.